

LAWRENCE W. LITTLE:
RECOLLECTIONS OF MY YEARS IN CARSON CITY
TEACHING HIGH SCHOOL, TESTING HIGHWAY MATERIALS,
INSPECTING HEAVY CONSTRUCTION, AND
PLAYING WITH WESTERN NEVADA MUSIC GROUPS

Interviewee: Lawrence W. Little

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Description

Lawrence W. Little was born in Colorado in 1900. He attended public schools and college in Colorado, and came to Nevada in 1924 to be a teacher at Carson High School. After several years as an instructor in mathematics and science, Mr. Little joined the Nevada State Highway Department where he had worked during summer vacations. In a long and distinguished career with the Highway Department's testing laboratory (he became chief of the division at the end of the 1950s), he took an age-related mandatory retirement. Still vigorous and far from ready for the customary retirement activities, Mr. Little started a new career as inspector on construction projects in western Nevada, a career he pursued into his later seventies.

In addition to business activities, Mr. Little pursued a number of interesting and productive avocations. A French horn player, he organized and played in musical groups of Carson City and Reno; an avid gardener, he supplied flowers for hundreds of public and private functions from his own yard, and, later, vegetables for a senior citizens center in Carson City.

Lawrence Little's memoir is valuable for its discussions of the evolution of testing processes for Nevada roads and highways; its historical perspective on an important state agency; the history of numerous construction projects, especially at Lake Tahoe; and the recountings of cultural events in the western Nevada area. Additionally, realizing the limitations of the interview process, Mr. Little personally interviewed a number of Highway Department veterans, and included the results of those conversations along with his personal reminiscences of their activities. The outcome is a series of biographical and character studies involving numerous Highway Department figures.

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An Oral History Conducted by Mary Ellen Glass

University of Nevada Oral History Program

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PREFACE TO THE DIGITAL EDITION

Established in 1964, the University of Nevada Oral History Program (UNOHP) explores the remembered past through rigorous oral history interviewing, creating a record for present and future researchers. The program's collection of primary source oral histories is an important body of information about significant events, people, places, and activities in twentieth and twenty-first century Nevada and the West.

The UNOHP wishes to make the information in its oral histories accessible to a broad range of patrons. To achieve this goal, its transcripts must speak with an intelligible voice. However, no type font contains symbols for physical gestures and vocal modulations which are integral parts of verbal communication. When human speech is represented in print, stripped of these signals, the result can be a morass of seemingly tangled syntax and incomplete sentences—totally verbatim transcripts sometimes verge on incoherence. Therefore, this transcript has been lightly edited.

While taking great pains not to alter meaning in any way, the editor may have removed false starts, redundancies, and the “uhs,” “ahs,” and other noises with which speech is often liberally sprinkled; compressed some passages which, in unaltered form, misrepresent the chronicler's meaning; and relocated some material to place information in its intended context. Laughter is represented with [laughter] at the end of a sentence in which it occurs, and ellipses are used to indicate that a statement has been interrupted or is incomplete...or that there is a pause for dramatic effect.

As with all of our oral histories, while we can vouch for the authenticity of the interviews in the UNOHP collection, we advise readers to keep in mind that these are remembered pasts, and we do not claim that the recollections are entirely free of error. We can state, however, that the transcripts accurately reflect the oral history recordings on which they were based. Accordingly, each transcript should be approached with the

same prudence that the intelligent reader exercises when consulting government records, newspaper accounts, diaries, and other sources of historical information. All statements made here constitute the remembrance or opinions of the individuals who were interviewed, and not the opinions of the UNOHP.

In order to standardize the design of all UNOHP transcripts for the online database, most have been reformatted, a process that was completed in 2012. This document may therefore differ in appearance and pagination from earlier printed versions. Rather than compile entirely new indexes for each volume, the UNOHP has made each transcript fully searchable electronically. If a previous version of this volume existed, its original index has been appended to this document for reference only. A link to the entire catalog can be found online at <http://oralhistory.unr.edu/>.

For more information on the UNOHP or any of its publications, please contact the University of Nevada Oral History Program at Mail Stop 0324, University of Nevada, Reno, NV, 89557-0324 or by calling 775/784-6932.

Alicia Barber
Director, UNOHP
July 2012

INTRODUCTION

Lawrence W. Little is a native of Colorado, born in 1900. He attended schools and college in Colorado, and came to Nevada in 1924 to be a teacher at Carson High School. After several years as an instructor in mathematics and science, Mr. Little joined the Nevada State Highway Department where he had worked during summer vacations. In a long and distinguished career with the Highway Department's testing laboratory (he became chief of the division at the end of the 1950s), he took an age-related mandatory retirement. Still vigorous and far from ready for the customary retirement activities, Mr. Little started a new career as inspector on construction projects in western Nevada, a career he pursued into his late 70s.

In addition to business activities, Mr. Little pursued a number of interesting and productive avocations. A french horn player, he organized and played in musical groups of Carson City and Reno; an avid gardener, he supplied flowers for hundreds of public and private functions from his own yard, and

later, vegetables for a senior citizens center in Carson City.

When invited to participate in the Oral History Project, Lawrence Little accepted readily. He was a full, generous, and cooperative chronicler of his activities through 58 taping sessions, all at his home in Carson City from January 11, 1971 to August 9, 1977. The memoir is valuable for Mr. Little's discussions of the evolution of testing processes for Nevada roads and highways, for its historical perspective on an important state agency, for the history of numerous construction projects especially at Lake Tahoe, and for the recountings of cultural events in the western Nevada area. Additionally, realizing the limitations of the interview process, Mr. Little personally interviewed a number of Highway Department veterans, and included the results of those conversations along with his personal reminiscences of their activities. The outcome is a series of biographical and character studies involving numerous Highway Department figures. Mr. Little's review of the transcript of

his oral history, assisted by his daughter Joan Remington, resulted in no significant changes in the text and only a few corrections of spelling of names. We gratefully acknowledge Mrs. Remington's assistance with the review. We also gratefully acknowledge assistance from Mrs. Ruth Little, whose patience with this project exceeded any requirements.

The Oral History Project of the University of Nevada-Reno Library preserves the past and the present for future research by recording the reminiscences of persons who have figured prominently in the development of Nevada and the West. Scripts resulting from the interviews are deposited in the Special Collections departments of the University Libraries at Reno and Las Vegas. Mr. Little has generously donated the literary rights in his oral history to the University of Nevada, and has designated the material as open for research.

Mary Ellen Glass
University of Nevada, Reno
1981

THE EARLY YEARS

I was born on the ninth day of the last month of the first year of the century, December 1900. I am not absolutely sure as to the exact place of my birth, but it was somewhere in Park County, Colorado, near a little town called Jefferson. I believe, however, I was born in a miner's cabin in a place called Tarryall Creek, or near this stream. I was born to May and Tim Troppe. I did not keep the name Troppe because my mother divorced Tim Troppe, probably in 1905 or 1906.

My first impressions as a small child—I can't remember certain things, and other things which were told to me I will not try to repeat. I believe one of the very first experiences that I can remember in a sort of a way because it was a very painful one, I had just learned to walk and get around, and apparently I found a nice place to sit down, which happened to be an ant hill. And big red ants really made mincemeat of a good part of my body. I didn't have sense enough to get up and get out of there, but I guess my screams attracted someone, and I believe it was my mother who got me out of that scrape.

Another experience I can remember (I must have been about four years old) was the observance of the miracle of birth. I'm reminded of the old psychology lesson we used to get about the youngster that he's associating things with things that he had seen, and the thought of green feathers. Well the old dog's name was Gyp. And I saw her lying down, and, of all wonders, there were rats coming out of Gyp, and they'd go right back around there. And I went and told my mother, I said, "Mama, there's rats crawling out of Gyp!" I knew what a rat was because we had wood rats. So my mother sat down and explained to me about birth.

I probably at this point should say a word or two about my mother and father. I know a lot more about my mother and my mother's people than I do about my real father's people. I say real father because later on, Ralph Little was, to all intents and purposes, my father, although he was a stepfather.

The Troppe lived on a ranch near Jefferson, Colorado, and I believe there were six—boys and girls, three boys and three girls,

and my father Tim came in there somewhere, but I'm not sure just where. The names were—these aunts and uncles—Aunt Josie (but probably her name was Josephine), and Aunt Clara, and Aunt Flossie. Now I believe that would make seven—no, six—no, six. Let's see. Then the boys—my father's name was Tim, and there was one they called Al (probably Alfred), and one they called Had. I think that was a nickname for Harry. The father's name was George, and the mother's name was Ciel. George Troppe, I believe, was a native of Alsace, France. I am not sure about Ciel Troppe, whether del was a contraction of Lucille, or whether it was C-i-e-l, which I think is a French name. They may have both been French.

These people lived pretty much from hand to mouth. None of them had very much education. My own father had very little. He was a laborer and a miner and a prospector. I really believe he devoted so much time to prospecting, which was not successful. These Troppes were not particularly well thought of—at least, that's the impression I received later on. And my mother in later years, and my stepfather, did not give us, my sister and me, much information about those people. So what I have just said is about all I know about these Troppes, except I do know, probably more from hearsay, that we had moved from place to place when I was very young. My sister was born in Denver. And I believe at that time my mother and father had gone to Georgetown, where he worked in some of the mines. And Georgetown being fairly close to Denver, I presume that is why my sister was born in that locality.

Later on, my mother and I presume my father, both were working at the La Salle ranch. And there, my mother became acquainted with Ralph Little. Oh, I cannot remember much about the circumstances,

but my mother cooked for as many as twenty men in a haying crew. And I believe she kept house. Sam La Salle was a wealthy rancher. The haying season usually lasted for about six weeks in late August and September.

Now, to go back for a little way and tell you something about my mother's people. My mother was born in New York state, Long Eddy, New York, I believe. And her people, the Peakes, have lived in that area since 1732. Just a few years ago, a man who worked for me down at the laboratory was a New Yorker, and it so happened he was acquainted with my mother's cousins. He brought back a family tree of mine, which I copied. This is why I happened to know this date, when the three Peake brothers left Connecticut in 1732 and settled in what was then called central New York, although as we know it now, it certainly would not be central New York. Long Eddy is roughly about 120 miles northwest of New York City, and it's located on the Delaware River, which forms the boundary at that particular point between Pennsylvania and New York state.

Peakes also established a small community called Peakeville. And, in examining this family tree, it's remarkable to see how many children they had in those days. That is it? Eight? Eight was a small number. Some of'em had twelve and fifteen. But, infant mortality, I guess, and early deaths from disease was quite a prevalent thing in those days, so not too many of them matured. I believe the Peakes around Peakeville were principally lumbermen. And I believe my grandfather did some of that, too, when he was a young man, and he did some of the same after the Civil War. By the way, he was a veteran of the Civil War. He fought with the New York Volunteers. He was in several of the big battles, I think Antietam and Gettysburg in particular, and

there were others, but I don't remember which were the names of the others. He married my grandmother, I believe shortly after the Civil War, and she was a Hitchcock. I can't remember her first name [Julia]. And I'm not sure what her people did. But I believe her ancestors were more or less Scotch, possibly Scotch-Irish. And my grandfather's ancestors probably were English descent.

My mother had two brothers and two sisters. The oldest girl's name was Calla. Next along came Aunt Julia. My mother was the third born to the Peakes. Charles was the fourth, and the youngest in the family was Will. I got to know my Uncle Charles very well. As I will state later on, I've had many experiences with him. The reason my mother went to Colorado was largely because of my Uncle Charles, who had gone there earlier and had established himself as a young single man in South Park, where he did the things that most young people did there for a living—he labored. And I believe he also had a small grocery store and ran the post office in Jefferson.

My mother was a woman of brown hair and blue eyes, probably of English descent principally, her maiden name being Peake, and the Peakes apparently had come over from the British Isles sometime in the early eighteenth century. She had been educated through approximately the eleventh grade and had taught school for a very short time, and had worked in her Uncle Cyrus Peake's business as a bookkeeper as a young girl in [Springfield] Missouri before she came out to Colorado.

I'm not sure about his business, but it seems he had some kind of merchandise. Maybe it was feed and grain, I'm not sure about that. I believe she taught school for a short time [in Colorado]. And that was where she met Tim Troppe. I am not sure

about all these circumstances. Some of it is from hearsay.

She was a very good person at writing. Her handwriting was beautiful, and she expressed herself very well. She was also a good bookkeeper and an excellent housekeeper in her younger years. As she became older, she was afflicted with arthritis very badly. She could also play piano quite well and could play practically any of the popular pieces. She was quite a person to meet with others and discuss the problems of the day. She was also very careful to see that her children received as much education as they could, and as much training. Although she was a Methodist, there was very little opportunity to attend church in the Gunnison country. Nevertheless, Bibles were available, and she had my sister and me read the Bible, and read much of the Bible to us. She also read us stories, and as we grew older, we subscribed to such magazines as the *Youth's Companion* and other magazines such as the *Ladies' Rome Journal*, and [she] saw to it that we got as much training of that kind as could be given.

When we were on the La Salle ranch, and my mother was working so hard, I believe it was about that time where she made up her mind to separate from my father, Tim Troppe. I believe that time was about 1906, probably fall or winter of 1906 because I was five years old. And we went back to New York by train and was met at the Long Eddy station by my grandfather with a horse and buggy.

I can remember quite a few things about living with my grandfather and grandmother during that year. My Uncle Will was a college student at Syracuse. He was home for vacations and home for the summer vacation. My grandfather's occupation, I think, was merely farming, and he made part of his living as a Civil War veteran on a pension. He was extremely deaf. He could not hear anything,

and there was no hearing aids which would help him at all. But he was an avid reader, and I can remember about his mispronunciation of a good many words because he could not hear them. And my grandmother, as I remember, was always busy doing something. If she wasn't getting meals, she was keeping house, she was doing sewing, and that kind of thing.

There was a stream flowed down through this little valley, near Long Eddy. The little stream emptied into the Delaware River. Of course, like all boys, streams interested me, and my uncle Will, when home from college, showed me how to catch eels. These eels, of course, would come up out of the ocean, up into the freshwater streams. And I never succeeded in catching an eel, but my uncle did, and they looked so much like snakes to me that I was wondering if they were edible. But they were edible, and we ate them.

I also remember the way they put up their hay. This one horse had to have hay, and I believe the one cow had to have hay. And my grandfather had a small meadow, probably as much as a half a mile upstream. And I went up there one time to watch my Uncle Will and my grandfather cut the hay. And to my amazement, they were doing it with hand scythes. I had seen hay cut in Colorado, but only with mowing machines—horse-drawn mowing machines. My five-year-old brain, (probably six-year-old by that time), I thought that was a very antediluvian way to put up hay, and told them so. But then, they showed me why they could not get a mowing machine in there, because there were old tree stumps all through the area, and that they could do very well for what hay they needed.

I also had an illness of some kind during that period. don't remember what it was, but it was some kind of fever. Whatever it was., I don't believe [my sister] contracted it.

But that was only a year, and I do not remember too many things. I think the anecdotes told by my grandfather and grandmother about what happened when they were children meant quite a lot. They were interesting. My mother also told about skating to school. That sounds rather far-fetched; however, they would get so-called sleet storms in that country, and the roads would be a sheet of ice. And the way the children got to school was to put on their skates and skate to school.

I recall an experience with my mother very similar to that. My Aunt Julia had married a man by the name of Grosbeck Waldron, who was a carpenter, and they lived down in the town, Long Eddy. And, of course, Grandpa Peake's place was removed from that maybe a mile or two. I can't remember. So one winter day, my mother decided to visit Aunt Julia, hitched the horse to the—they didn't have sleds. [She] hitched the horse to a buggy. We managed to get the horse and buggy as far as Long Eddy, but Aunt Julia lived up on a hill, a rather steep hill. And it was so icy, we simply could not walk up that hill. So finally, we went up on our hands and knees, and cloth on our clothing gave us enough friction there on the ice so we made it. I can remember that event.

I remember quite a little about the vegetation and the flowers. I was always in love with the things of nature. And I sometimes had wandered quite a little way from home in search of various wild flowers, but I was warned about the rattlesnakes because there were rattlesnakes in that country. It was rather mountainous. The mountains came down through there (I believe it was part of the Catskills) clear down to as far as the river. And the timber was all hardwoods, such as maples, oaks, butter nut, hickory nuts, and others. And in the fall of the year, there would be a world of nuts, hickory nuts, butter nuts,

wild walnuts, and in those days, chestnuts. Since that time, all the chestnuts, native chestnuts, have been destroyed by disease. And, I enjoyed going out with my uncle and my grandfather gathering nuts. There were wild strawberries, wild raspberries, wild blackcaps, and wild blackberries in the country. Strawberries grew right on the hill [in] back of our house. My great-grandmother Hitchcock was alive at the time. I would go up and pick the strawberries, and my great-grandmother would fix them for me and for my sister with cream and sugar.

I remember doing just a very few chores, such as churning. The cream was allowed to sour, and the churn was one of these upright, conical affairs with a hole in the top in which a plunger was inserted, and you ran that up and down. You could tell when the butter came because the stem of the plunger would have bits of butter in it, and the sound was a little different. I can remember those things.

The time we were ready to leave there and go back to Colorado, my mother wanted to make sure that my sister and I would have a chance to see the Atlantic Ocean and New York City. So we went down to New York City, and I can remember, very clearly, two things. I can remember the Flatiron Building, which was the tallest building then; it seemed to be the apex of an angle formed by two streets coming in at an angle. And I can remember riding on a horse-drawn streetcar. They may have had other kinds, but some of the streetcars in those days (that was 1906) were horse drawn. Now, Denver had the other type. I thought Denver, to my small way of thinking, was a much more modern city than New York City.

Then my mother took us out on to a little strip of Long Island, a little neck which works back down south of Long Island and below Manhattan, to a place called Far Rockaway

Beach. I believe that it's just known as Rockaway Beach. There's quite an area there now, but at that time, it was known as Far Rockaway Beach. So we did get a chance to see the tides and see the ocean.

To the best of my knowledge, we left the New York area, probably in late spring of 1907, and settled, temporarily, at least, in Denver, where my mother obtained work with a private family doing housework and probably some nursemaid work. I cannot remember the name of the family at this time, but we children stayed there with her, and we all lived in this apartment.

At that time, I remember seeing Ralph Little come to the house several times, and he'd bring candy to Helen and to me. And it was made known to us that his wife, Edna, had divorced him and married the wealthy rancher, Sam La Salle. In the meantime, he probably had quite a case on my mother and they apparently decided to get married. As I recall it, we took a trip up into Wyoming, and I believe they were married there.

While in Wyoming, we settled temporarily in a hotel in a place called Lander while Ralph Little looked around for possible things to do up in that area. When he was a younger man, he had gone to Montana, around Dillon, and he was quite a horseman. He would break horses at that time, which his boss sold to the English for use in South Africa in the Boer War. And he liked that kind of country, but for some reason or other he did not make the connection he thought he could make in Wyoming. So he returned to Denver and lived there for a while.

During that interim, I recall that the moving picture shows were a nickel per show, and each show lasted about an hour and they were the silent pictures. My sister and I were

given about twenty-five cents apiece almost every day. That would take us down on Curtis Street, and we could see about three shows and buy ice cream, for about twenty-five cents apiece. That occupied our time and gave our folks time to themselves.

At this point, I probably should tell you something about Ralph Little and his family. He was born in Illinois. He was the second boy in the family, of two boys and five girls. They settled in the farm country in Nebraska in a settlement known as Fairmont. And he would tell about having to live at first in sod houses because there was no timber and no other means from which to build the houses. Later on, timber was obtained, and they did build a house.

Ralph Little was a large man, six feet tall and probably weighed a hundred and eighty pounds, with rather large features. He was gray-haired from the time he was seventeen. He did not know what caused the gray hair. He was a very strong man. He was also very strong-willed. And he insisted on everyone in the family doing his share of the work which he could do. He was an extremely strong man. I have seen him get his back under a flat rack and remove it, one end at a time, from the sled runners and place it on the wagon running gear. I presume those flat racks weighed pretty close to eight hundred pounds. He was also very adept at handling horses. At one time, he broke horses for the Boer War in Montana as a young man. He was also very adept at making repairs he could make to his ranch machinery. He was careful about the care and feeding of all the livestock, the work horses, the saddle horses, and the cattle. Although he was not an educated man, having finished no more than perhaps the sixth grade, he knew about vaccines and other treatments, [and] precautions to take in raising cattle. [In] the

spring of every year, he would vaccinate all the calves against an ailment called black leg, which, if let run rampant, was fatal to many cattle herds. He was not particularly a man of culture, but he certainly could remember stories of the old times. He and some of the other ranchers would get together and “spin yarns,” as we used to say, the children sitting around, taking it all in. There are several of his yarns which may bear repeating.

One of his boyhood experiences was highly interesting as well as humorous. I have heard him tell it many times, and I think it bears repeating here. As a young fellow in Nebraska, of course he went to school for a short time, and in those days the schoolhouses were probably built of sod, the same as the other houses. And very often, the first time a child would see school, he probably was no longer a child, but a young adult. The story I have in mind is the one about the Allen family. The Allen family consisted of the mother and the father and two boys, Duff and Watt. Duff, I believe, was the one that stammered, and Watt was cross-eyed. They had gone to school. Duff apparently could not do much without stammering. He could finish a sentence if he first said, “Damn.” I’ve heard my dad say that the teacher would ask Duff to make a statement; he would stammer, stammer, stammer, and finally would stop and say, “Damn it, it’s so and so.” Anyway, so much for that.

But one story, in particular, about the Allens was quite interesting. It seemed in those days traveling revivalists, preachers, would come and put on what they called a revival meeting, and many of the ranchers and farmers would go. And the Allens were noted for being pretty rough and boisterous people, but they succeeded in getting religion. My dad and his little partner, Johnny Boserman, who

was a short little fellow, were walking along the road one day, when along came the Allens, Mr. and Mrs. Allen, up in the wagon seat, with Duff and Watt in the wagon box behind.. And they stopped and offered Dad and Johnny Boserman a ride, which they accepted. They hadn't gone far before the rear steel tire had come slightly loose, and they were afraid they would lose it. So they stopped and got some barbed wire from one of the fences alongside and wrapped the wagon wheel where it needed the wrapping with the barbed wire. Now, Wattie was the young fellow who was cross-eyed. He was nearest the wagon wheel, and we were riding along, and Mrs. Allen said, "Now Wattie, you keep your eye on that wagon wheel and see that that tire doesn't come off." Well, Wattie had to get his head down quite close to the tire in order to see it with his crossed eyes, see that the wire was holding it on.

I think something went through the minds of both my dad, Ralph Little, and his pal, Johnny Boserman, at the same time. And one of them (I don't know which it was) looked at the other and gently hit Wattie on the head just as the barbed wire came around, and it got a piece of Wattie's nose. Both Ralph and Johnny jumped from the wagon and started to run. But before they got out, they heard what went on. Wattie began to swear. And Mrs. Allen yelled to him, "Bear your cross, Wattie. Bear your cross."

His exclamation was, "Bear your cross, hell! Jesus Christ never had his nose on a wagon wheel wrapped with barbed wire!"

Ralph Little was respected by all of his contemporaries because of his knowledge of livestock, and ranching in general, and in later years (I believe sometime around 1917 or '18, or perhaps a little later), he became county commissioner of Gunnison County. Happenings in those years will be described later on.

[Ralph Little's] father became one of the early sheriffs of the county, and my dad, as I called Ralph Little, would tell some pretty wild tales about the outlaws and the sheriffs' posses in those days. His brother, John, was given a portion of ground to work, and Ralph was given a portion of ground when he was seventeen. I believe it was eighty acres. He sowed the whole thing; took all of his savings, and bought oats, and sowed it to oats. He said the oat crop was doing beautifully, but it was not quite ready to harvest when one of those drying winds came, and, as he stated, "burned up the entire thing."

That was a terrible disappointment to him. He immediately left Nebraska and came to Denver, where he got a job in a feed mill. He stayed there several years. He used to tell anecdotes about his stories there. He was well acquainted with a man by the name of Phil. I can't remember the last name. But this man Phil was married to a woman who was a clairvoyant. I can remember the stories my dad would tell about the things that happened.

I recall one time when Dad met Phil and they stopped somewhere for a beer. And then they went to an office somewhere before [going home to supper]. It was about suppertime, and Phil was going to be late for supper. There was a red-headed stenographer there, and this man who was the office manager bet Phil five dollars that he didn't dare go kiss that stenographer. Well, Phil took him up, went over, and, of course, the stenographer slapped his face. But he got the five dollars. He invited Dad to go home to dinner with him. Dad said the minute they opened the door, Phil's wife was there, "Give me that five dollars."

"What five dollars?"

She said, "The five dollars you got for kissin' that red-headed stenographer."

Another time, later, my dad and his sister, Agnes, who followed Dad to Denver and was

working in some office, were calling on these people, whose name I can't remember—anyway, Phil and his wife. And at the dinner table, this woman went into kind of a trance. And she said, "Ralph, you and Agnes are going home to Nebraska, a little trip. And you'll do that in about two weeks."

They both said, "Oh, oh, no such thing! We have no idea of doing anything like that."

But they'd sort of forgotten about that, and Dad said one day Agnes picked up the paper and read about an excursion (race) in Nebraska. She said, "Let's go." They decided to go and went, and then on the way they just happened to think what this lady had said to them.

After working in Denver for a few years, Ralph Little apparently went to the South Park and became a ranch foreman and married this girl Edna, whose last name I don't remember, nor do I remember the date of his marriage. I know his age. I believe he was born in 1873, and he was probably about six years older than my mother.

While we were in Denver (I believe it was in 1907), Ralph made a trip into the Boulder country, which is located only thirty miles west of Denver. And there he managed to obtain a lease on what was called the Chase ranch. And sometime in early 1908, or probably the late spring of 1908, we moved to Boulder to this ranch, the Chase ranch, which is located about three or four miles out of Boulder. And we lived there for approximately four years. This ranch originally was of 160 acres, but ten acres were taken out, sold as an asparagus patch. And on this ranch, there was mostly hay land and places where corn and a garden could be grown. And there was an orchard containing about as many as thirty trees, probably, and the usual pens for pigs, and geese, and calves, and horses, and other livestock.

In referring to the kind of apple trees in the old orchard, I can remember fairly well the names which were made familiar to me by my mother. One old apple tree out by the woodshed was a Whitney Crab, which developed quite early. The Whitney Crab was a rather large crab apple, much larger than some of the modern ones, was very sweet and juicy, made good jam and jelly and cider. Other early apples were Yellow Transparent and the Maiden Blush, and the wealthy. The Wealthy was a rather large apple, striped—red and green. I can well remember how my sister and I used to like to go out into the orchard when the Wealthy apples began to ripen and try to beat the old white sow to them as they fell down. The old white sow was an expert, and she knew what to do. She would take a bite out of each apple, then go to the next so that we wouldn't pick those up to use them.

A little later on came the Grimes golden, and the Winter Pearmane, Gano, Jonathan, and a worthless apple, to my notion, called Ben Davis [laughing]. The Ben Davis apple was pithy and it was not at all palatable, except very late in the winter. The reason so many of them were grown in those days was that they were excellent shipping apples and would keep a long time. The variety, as far as I know at the present time, is completely out of commerce.

To the best of my knowledge, there was only one real good apple crop while we were at Boulder. These were picked by driving teams in the orchard with flat racks, and the men would reach up into the trees, sometimes with the help of ladders, and pick the apples in the flat rack. My stepfather brought in a cider mill. These apples were ground, and the entire crop, as I remember, was made into cider. The cider was placed in barrels, probably about thirty, forty gallon barrels and allowed to ferment, and eventually was made into vinegar, which

was sold to the Garvin store, as I remember, for quite a little profit.

Ralph, my dad as I called him then, was a great hand with livestock, and he understood how to break a horse, to work or how to ride, without particularly hurting the horse. He was a lover of horses. We were taught, that is, my sister and I, to handle horses at early ages, and to ride horses, and how to work horses and hitch them up. While in Boulder, we also had quite a few cows. Dad would milk these cows. The milk was separated and the cream allowed to sour, and my folks made butter and they sold butter. And they sold chickens and butchered pigs and sold those to make a living. They also sold quite a lot of hay. This produce was taken mostly to a man by the name of Garvin, who ran a general store in Boulder. And I believe a lot of this was simply a trade proposition rather than cash transactions. They would take butter and eggs and other produce in and trade it for groceries.

My sister, Helen [born December 11, 1902], is two years younger than I. Her interests as a young girl seemed to be centered around horses. Before she had a pony of her own, she used to ride a stick horse, and had a little switch to switch the stick. And she would talk to it as she would scramble up and down the road on the stick horse. Later she became quite a horsewoman and was very good around cattle as a cowgirl. She was also quite musical and had a fairly good voice. She took lessons at the time she went to high school in both voice and on the piano. But an illness which she had in later life sort of interfered with those features. She was a fair student, but I think she was a dreamer and dreamt mostly about ponies and horses, and the fact that she did that no doubt affected her

grades to some extent. She could do almost any kind of men's work that had to do with the handling of livestock and horses. She would help in the hay field, she would run the stacker team as a young girl, she would ride and help get the cattle in and out of the fields and on the range. She was also an excellent cook. She had to help her mother a lot during the later years when my mother's hands were crippled with arthritis. She didn't have the opportunity to finish school that I had, but she did the best she could with the faculties she had. I will report more on her doings at a later time. Helen was a typical brunette. She had dark brown hair and brown eyes. She was a very nice-looking girl.

All fuel in those days was wood or coal. There may have been gas in certain places, but on the ranch places everyone burned wood and coal. The coal, where we lived, usually came from Lafayette or Marshall, where the coal mines were, about ten or twelve miles away. I believe you could buy coal at the mines in those days for as little as three dollars a ton. You hauled it, of course, yourself. Wood was plentiful, but usually, just enough to start the fires to burn the coal.

I remember my chores (when I became older, I could do them), in particular, was to build fires and remove ashes. That was rather an irksome task. And finally, I was old enough to do other things, such as drive the stacker team to stack hay. My sister did the same when she was as young as eight years old. I was doing it by the time I was nine.

During this period, from about 1908 to 1912, at Boulder, some of the customs of the time are particularly interesting. I recall that women's dresses went clear to the ground. And it seems to me they wore lots of dresses.

They weren't simple dresses; they were several dresses. And they were all heavily clad, to the best of my knowledge. Men's clothing hasn't changed much through the years. And children's clothing in those days was quite a little different that it is now. The girls wore long dresses rather than short dresses like little children do at the present time, and the boys, of all things, had to wear knee breeches, which we didn't like to do because we really should be fifteen or sixteen before you could have a pair of long pants. And these knee breeches were bunglesome things. Then we all had long stockings which were held up by a series of belts to which were attached garters. Most little boys, after being cleaned up and sent out to play or sent to school, after a couple of hours would be pretty shabby-looking creatures, one stocking down and one stocking up, with garters hanging down, with shirts torn or dirty. But that was the way things were.

There were certain days set aside for the different tasks, household tasks in particular. Monday usually was the wash day, Tuesday was ironing. There may even have been a baking day. Sometimes that was on Wednesday. In those days, people did many things for themselves instead of buying readymade things or foods already prepared. During the fruit season, the purchases were made in quantity lots, and the fruit was put up—made into jams and jellies and fruit preserves. That was always quite a task. And since my folks made butter and sold it, and sold eggs, and sold pork, there were certain days of the month where butchering was done. That was quite a task. We kids had to help with that, particularly in scraping the pigs. The pigs were killed and then dipped in the hot water, and then the hair was scraped off. Then the rest of the butchering was done,

and we had to take part in that, particularly on the cleanup, and little boys and little girls helped.

My sister's chore was to gather the eggs. I had to feed the chickens. I also had to take food to the pigs, and I had to feed the little calves. Milk was separated, and the calves were given the separated milk, free of the butter fat, of course, which was retained for making butter.

We had other chores, miscellaneous chores of doing the dishes, which was all done by hand, as dishwashers (machines) were unheard of in those days. And, of course, my sister helped with the household tasks but she much preferred to be outdoors around the horses. She later became quite a horsewoman, and to this very day is very fond of livestock.

Something must be said about health.. My family had ups and downs in the health department. I had pneumonia several times. We had the usual childhood diseases, such as mumps, measles, chickenpox. Usually there was a family doctor. Sometimes, he lived so far away that most of your doctoring had to be done at home, and there was usually always a variety of patent medicines available, some of which would be classified as nostrums, probably. But they were available, and sometimes, or we thought, at least, they gave us some kind of relief. My mother's health was fairly good, and Ralph Little's health was always rather excellent, but in later years, my mother had severe arthritis.

Now, turning to the school days, there were no school days for me before arriving at Boulder. In other words, I was seven years old before I attended my first school. And as I recall, the very first school I attended was the Base Line School, located about two and a half miles east of Boulder, on the Base Line Road. The name Base Line comes from the fact that it was, I believe, the fortieth parallel,

which is also the borderline between Kansas and Nebraska, extrapolated westward and called the Base Line.

In this school, there was one person in particular who was my real buddy. His name was Arleigh Burke. His father was a farmer, living near the schoolhouse, Oscar Burke. He was a heavy-set man. His mother was a red-haired woman, and he had a sister whose name I don't remember at this time. Arleigh and I were buddies. We would visit each other on weekends. We had a hobby of "Indian wrestling," which may be something that is unknown to the modern-day child. But the boys lie down on the ground, Number One's head next to the feet of Number Two. Your leg next to your opponent thrown in the air, and you would grapple legs. They try to turn the other fellow over. That was quite a thing to do.

I lost track of Arleigh Burke through the years, but I received a letter from home one day stating, asking me, if I had read about Arleigh Burke, who was in World War II and in command of a destroyer squadron. And he was known as "Thirtyknot Burke." Later on, during the Eisenhower administration, Arleigh was made Chief of Naval Operations. I have never tried to renew this acquaintance. I probably should have written to Arleigh like many other things, though, but did not get done.

As near as I can remember, I covered only part of a year at the Base Line School. At that time, another school was established on what was called the Valley Road, which was just a mile north of the Base Line Road, and actually in the northwest corner of the hundred-acre-acre farm—or, ranch, rather. And I continued there. It seems to me I did the second and third grade and part of the fourth in the Valley School. My sister started to school and did her first and second grades there. And a very fine teacher, man teacher, by the name of

Mr. Morrison, is to be remembered. He was very patient and well liked. However, he kept strict discipline. I remember in a corner of the schoolroom up near his desk, there was a stack of willow switches, about a quarter of an inch in diameter and perhaps three feet long. And he used those whenever necessary. And discipline was no problem, really, for him. In those days, there was no rules and regulations about teachers disciplining children.

One memory of Boulder, Colorado stands out, and that is the memory of a gentleman by the name of Fred Chase, the son of Mr. Chase, from whom the ranch was leased. Fred Chase was an astronomer and a professor of astronomy at Yale University. And he spent his summers usually in Boulder. Since he was raised on the ranch, he used to come out and visit. He took particular pains to take me around the ranch and show me things and explained some things about astronomy—that is, some of the simple things, and he also taught me how to spell some words. I remember one word which I will never forget. It's a combination of words, really, meaning "evil to him who evil thinks." And he taught me the French of it, which is *Honi soit qui mal y pense*. And I can remember—I think it has twenty letters and goes something like this: H-o-n-i s-o-i-t q-u-i m-a-l y p-e-n-s-e.

During my stay in the Boulder area, we were visited by Frank Collard, an old South Park acquaintance of the folks, and his new bride, who was nineteen. I believe Frank was about twenty-five. The bride was also raised in the Park County, and her name had been Janie Peabody. They spent about a week with us during their honeymoon.

And shortly after that time, my dad and Frank Collard and Frank's brother, Will Collard, who lived in South Park, apparently had been reading about the Gunnison country.

And apparently, some arrangement was made where they would visit the Gunnison country and look it over for a possible settlement in that area. Park County was known for its wire-grass hay, which was used for racehorses all over the country, but it was a crop which produced perhaps not more than two or three tons at the most per acre per year. And you had to have a large amount of land to make a good living, and I think that probably had an influence on the Collards, and my father was also—my dad, I should say—was also interested in the Gunnison country.

I believe it was about early spring of 1912, or perhaps in the winter, midwinter, of 1912—I can't just quite remember, but we discontinued the lease on the Chase place and went to Como, Colorado and lived with the Collards for a while, an interim of probably two or three months, 'til arrangements could be made for the Collards to sell out and to pack bag and baggage and go to the Gunnison country. I can remember mostly the school at Como, because during that short interim, we did continue in school at Como. Como was about two miles away, and the two boys, the sons of Will and Hannah Collard, and Helen, my sister, and I—the four of us, drove a burro and a cart to school. I can remember how reluctant was the burro to make that particular journey. But on the way home, there was no problem at all. We really got home in a hurry.

A word about the Collards—my mother and Hannah Collard (who was of Norwegian descent, her maiden name being Hannah Jacobsen) were good friends in my mother's early days in South Park, even before she met Tim Troppe. They had become lifelong friends. And the Collards knew my stepfather, Ralph Little—Will Collard, Frank Collard, and Dave Collard. Dave did not move from the Park, but Frank and Will did. And I

believe it was the idea that all three of them would go to Gunnison. That is quite a little story in itself, how we got out of the Park and how we got into Gunnison. I'll discuss that briefly.

First, I can remember a few humorous incidents. Royal Collard was the oldest of two Collard boys. Edward Collard was about my age. I believe there were only a few days' difference, his birthday being in November, and mine in December. Royal was quite talkative. And at that age, which probably was about thirteen, he was kept away from the men when the horse traders would come because Royal had the habit of talking too much. I recall one time when Royal was sent to the house when the horse traders came in to look over the Collard's horses. And he was supposed to stay in the house, and stay there until the horsemen were gone. But he was in the upstairs room, and he opened the window. And one particular horse came out. I imagine that he was about a hundred and fifty feet from the horse at the time but he yelled at the top of his voice, "Hey, you don't want that horse! It's balky!" Needless to say, that horse was not sold. But Royal was the recipient of a good switching put on by his father.

Another incident of that particular time happened between Ed Collard and myself. We used to play around what was called the butcher wagons. Collards killed beef and peddled the meat around the county. Inside this butcher wagon were heavy weights which were used on the type of scales [which were used] to weigh the meat. Ed was on the ground, and I was in the butcher wagon playing with the weights, and one day I dropped the weights and just about broke one of Edward's toes. That was not a humorous incident; it was rather a bad situation. remember getting a good tanning for that particular thing.

Mrs. Collard had a cousin by the name of Fred Jacobsen, who was a New Zealander and a bachelor. Fred abhorred cold weather. He spent the summers in the northern hemisphere, in Colorado, usually helping with the hay and helping around with the chores at the Collard's. Soon as cold weather came, Fred would go back to his home in New Zealand, in the southern hemisphere, to absorb what was their summer weather. Fred liked children, and I was around him quite a while. I can remember his nomenclature regarding certain instruments and appliances was quite a little different from those used by us. One time I was playing around the yard, and he was fixing a piece of machine, and he called to me, "Lawrence, bring me a shifting spanner."

"A shifting spanner," said I. "What is a shifting spanner?"

"Oh!" he says, "You know. You call it a monkey wrench."

I remember one thing in particular about the Park County area, especially with reference to the Collard ranch. Along the evening, almost every evening, the numerous coyotes would set up a howl. An individual coyote would make a noise something like this: "Ou-wow, ou-wow-wow-wow, ou-u-u-u-u. Ou-ouou-ou-ou. Ou-u-u-u-u." When there was many of them together, the noise was something terrific. Of course, if anyone approached them, they would stop.

Presumably, Ralph Little and William Collard, also Frank, had made some effort at some time or other to contact people in Gunnison County regarding the ranch properties. I don't know just how this was done, but some kind of temporary arrangements had been made so that it was decided, probably March or April of 1912, to move all the supplies and all the livestock possible, using covered wagons. So we had

a covered train; I believe there were two or three covered wagons, and the kids driving the burros in the cart. All the household goods and belongings were put into these covered wagons, and we started out. I believe it took us about seven or eight days to reach Salida, Colorado. We could not get over Monarch Pass into the Gunnison country because of deep snows. The roads were not kept open in those days. So we unloaded things in Salida, and the menfolk went over to complete arrangements for settling in the Gunnison country. My mother and sister and I stayed with our Aunt Agnes Kramer in Salida. Agnes was Ralph Little's sister. Uncle Date Kramer ran a jewelry store and was the official watch repairman for the Denver and Rio Grande Railroad, which ran through Salida. I believe the Collards arranged for quarters nearby—that is, the womenfolk and the children, waiting for a chance to be shipped with belongings into Gunnison country.

We arrived by train at Parlin, Colorado sometime in early May of 1912. And the Collards had arranged to settle on a ranch about two miles northeast, I believe it was, of Parlin. And Ralph Little had arranged to buy the Sorensen ranch, about four miles from Parlin. We settled after a few days. The Sorensen family consisted of Sam Sorensen and his wife. There was very little livestock left on the ranch, just a few head of horses, and, I believe, one milk cow. And the Sorensens stayed on the ranch, which had two houses, an old house and a new house, so that both of our families could stay there. Sorensens stayed on for about a month or six weeks until we all became familiar with our surroundings, and then they left. Sorensen's name actually was Soren Sorensen, Danish, but his nickname was Sam. His brother, Charles Sorensen, owned the next ranch, and we became acquainted with his family at a later date.

Having arrived in early May in the Gunnison country, we found things beginning to turn green after the usual long winter. We also found that there was no adequate school in the vicinity. But arrangements had been made to reactivate the school. However, it was so near the end of the season that we did not attempt to go to school in 1912 until that fall. There was a little old schoolhouse called the Sparta School, just about twelve hundred feet above our ranch, along the road. And that was where all the children up and down the creek, Quartz Creek, went to school, through the first to the eighth grade, in later years.

I recall one of the first teachers we had was a very elderly lady by the name of Mrs. Day. She was so aged that she was quite childish. And she could not be retained, and there was quite a to-do about keeping her as long as they did. So that she was soon let go. Then a younger teacher by the name of Alice Lassiter, a graduate of the state normal school at Gunnison, was obtained. Alice Lassiter taught for one year in the school, and later on, she was replaced by a lady by the name of [Margaret McLaughlin].

Margaret McLaughlin was the name of the new teacher. She was a native of Carbondale, Illinois. She was a woman about twenty-six years old, unmarried. She was a very fine teacher and a very fine person, well liked by everyone in the ranch community, as well as being well liked by the children. She taught all the grades. However, the total number in the school probably did not exceed about thirteen to fifteen or sixteen, so some of the grades were vacant. But Margaret had a better system than any I had ever seen, heretofore, for teaching. And she had very good cooperation from the children. I believe there's quite an advantage to attending a one-room school. I recall that by the time I had finished the

fifth grade, I knew about everything there was in the sixth, seventh, and eighth from listening to recitations by the other students. And I believe I skipped one grade. We used to have such things as spell-downs, which I don't believe are heard of any more. It started in from the little kids to the big kids. The first words, of course, were easy for the little ones; they soon were spelled out. But they listened to the rest, and they all learned to spell the bigger words as time went on. We had little plays and little games and little debates in this school, and it was made quite a community center under Margaret McLaughlin.

Margaret taught there, I believe, about three or four years, at the end of which time she married one of the young men by the name of Robert Bain. She introduced a little music. I believe we had an organ, and we learned to sing quite a number of the songs, such as "Old Black Joe," "The Battle Hymn of the Republic," and "Sweet Alice Ben Bolt," and many of those old songs. We had no instrumental music.

The school ground was large enough for quite a play area, and we often did not have enough people to have two baseball teams, but we used to play what was called "one old cat." And we had played other games called "pom-pom, pull away," of course, "hide and seek," and "anti-over." And another murderous game called "Nurquey," but this was played by boys only. That was a game in which, say there were ten boys playing; there were nine holes dug in the ground, and everyone had a club, or a taw, as he called it. One person was IT, spelled with a capital *I*, capital *T*. The person who was IT had a club, or a taw, and a tin can, which he knocked around among the other people. They could take the taw out of the hole and hit that tin can, and he had a chance to get his taw in that hole. In that case, the other man was IT. Well, if he didn't do it, he had to

go shag that can. The murderous part of this particular game was the skinned up shins and sometimes arms and other parts. I believe the teacher finally made us quit playing that game.

My introduction to smoking took place in the little old school. What we did, we took tissue paper and sagebrush leaves. What a horrible combination! But none of the boys used tobacco. Swearing was almost unheard of on the school ground; however; it was part of the vernacular language among the ranchers of the country. Sometimes the air was quite blue when a balking mule team was giving problems to Ralph Little and to the Collards and others. But we as children kept pretty clear of that kind of language through efforts of our mothers.

All ranchers, to a degree, were pretty much self-sufficient in that they did their own repair work, built their own fences, broke in their own animals—dray horses, saddle horses, so forth—took care of their own water systems, irrigation ditches, and fencing. This would require that each rancher have a supply of certain kinds of equipment and tools. On almost every ranch of that day you would find a tool shed and a machine shed. Winters were quite severe, and there would be as much as five or six months of the year in which wheeled traffic was useless. Therefore, running gear was provided for the wagons, and sleds were substitutes for buggies. And the sled running gear usually consisted of two sets of running gear per each vehicle. For example, the hay rack, or flat rack, was removed from the wheeled vehicle over to the sleds. And that was the way we hauled our hay and the way we traveled in the winter.

Sometimes we had one horse hitched to the shafts of a single vehicle for driving to town or doing something like that, but more often, we used a team of horses attached to the sled or to the buggy for our social

travels or travels to market. Harnesses had to be repaired. The farmer, therefore, had to be equipped with the cutting tools and the riveting and rivets to repair his harnesses. He also had to have his own horseshoes. Most farmers also had a forge, where they made horseshoes and repaired the metal parts to equipment. The hay country required mowing machines, hay rakes, and bull rakes (or go-devils, as they were sometimes called) to push the hay up to a stacker which may have been an automatic stacker, which was run by a stacker team [which] lifted the hay up and then dumped it onto the haystack. All of this machinery had to be kept out of the winter weather. Therefore, it was put under cover in what was called a machine shed and during the wintertime, repairs were made. Sometimes, the go-devil teeth, for example, which were long teeth—bought ones had the metal tips. But as those would break, the farmers or ranchers would replace them with poles they had cut down in the mountains, [from] which they had removed the bark with what was called a drawshave, and they were shaped up and with brace and bit holes were bored through to put in the bolts. The winter was occupied by a rancher's doing this kind of thing because in the summertime there was not time. The same was true with many of the household goods. What needed to be [repaired] about the house was usually done [in the wintertime].

Modern plumbing, as it is known now, was not available in any of the ranch houses in that area in that particular day. Water came from a well. It had to be carried up to the house and was left in buckets. The Saturday night bath was quite an event. There [were] very few ranches equipped with modern bathtubs. The bathtub consisted of about a thirty-gallon galvanized washtub which

was placed on the floor. The wood and coal stoves were always equipped with what was called a water back and tank. The water back transferred the heat from the firebox over to the water tank. So you had a tank of hot water, and you could dilute that with the cool water to get the correct temperature for your bath. In some families, where heating the water was something of a problem, there was a bath routine whereby the babies came first, next the growing children, next the mother, and finally the father. They may have all used the same water. That, however, was not always the case. The water was usually changed.

Clothing was changed usually, work clothing, especially, but once a week. And the wash day was usually always on Monday, ironing day on Tuesday. In those areas, most machinery, household machinery, and machinery in connection with the milk, such as the cream separator, all of those things were hand-operated. I was the motive power for most of those on our ranch. The ice cream freezer was a job to work on usually on Sundays, the washing machine and the wringers on Mondays, the grindstone, depending on what needed sharpening and when. The pump usually didn't have a wheel to turn it, but there was a pump handle on it, and that supplied the water.

There were other chores for boys to do, too, and I was initiated into those at an early age. One was to prepare wood supplies. Wood was sawed mostly by hand. We'd use a bucksaw or a large saw, and split with a common axe. Then, of course, the wood had to be carried. And the coal had to be broken up and carried into the house. These were boys' chores, but girls were not excepted. When boys were not available, the girls did it.

Another chore in winter was to thaw out the pump. Temperatures ranged from zero to as low as forty degrees below zero, sometimes

the temperature not getting above ten or fifteen degrees above zero for a period of six weeks. So very often, the pump would freeze, but there was usually enough hot water in the tanks that you could get a supply and go down and pour it down the well until everything was loose, and then you could work the pump.

I have described rather loosely some of the ranch routine, but seasonal routine, to go into a little more detail, went something like this: the winter I've pretty well described; not much could be done in the way of agricultural chores. The ground was frozen and snow covered; you could not plow; you could not plant crops. So winter was used for making repairs, and feeding livestock. Whenever the natural grazing areas were covered with snow, it was always necessary to feed hay. That was a chore which had to be done once a day. Some of the ranchers like Ralph Little, my stepfather, managed to seed new areas in the meadow by simply feeding the hay on those areas once the sagebrush were removed. There would be enough grass seed in the hay thrown out there during the winter to come up in the spring. And usually in two years' time, it was fairly well established, and it was not necessary to buy the seed unless a new variety had to be planted. So the winter work was principally feeding livestock, doing chores, and making repairs.

Come spring and the snow was gone, one of the most irksome tasks, from the standpoint of a boy, was to drag the meadow. Meadows that were pastured had piles of refuse from livestock which had to be spread out evenly over the meadow in order to make a good foundation for cutting the hay. So the meadow had to be dragged. This was done with, usually, three horses or three mules pulling a drag which was a homemade affair consisting of a plank usually about eight by eight and possibly ten feet long, with big spikes run

through it which acted as a breakdown for some of the harder materials. And fastened to this big plank were cross-pieces leading to another, lighter plank perhaps ten feet back of the first one. And in between those were placed limbs of trees or brush which spread the manure and other meadow refuse rather evenly. A wagon seat was fastened to this, so the driver had a place to rest. I recall many a day spent on these drags in the month of March with the wind blowing, dust in your eyes, cold, and burning to a crisp in the sun and wind. This, indeed, was a very unpleasant but very necessary task.

Dragging the meadow, just described, was perhaps about the first of the heavier tasks performed in the spring, although at certain times, depending on conditions of the road, hay for sale was hauled by wagon rather than sled. Markets for the hay consisted of the mines, which were quartz mines, usually gold and silver mines, up what was called Gold Creek, and around Ohio City, and what was called the “stick camps” at Pitkin, Colorado. By stick camps, we mean the places where the smaller pine trees were cut—those four inches to five inches in diameter—and made into ties used in the mines. These, of course, were not anything like railroad ties, but most of the mines had rails in them, and the ore cars were hauled by mules. They had to have support, and the stick camps were the place where these ties were prepared. And horses and other livestock were required for all operations. Therefore, hay was quite an item of commerce to the ranchers. So hay was hauled in the early spring, and sometimes, if necessary, was hauled on sleds in the winter. I can remember a few personal experiences during the Christmas vacations of hauling hay with the temperature down to perhaps thirty below zero.

It’s interesting to note (this is kind of a sidetrack, but I’m going to mention it at

this time) how you had to be dressed to do that kind of thing. You’d usually load the hay up the day before, and get up early in the morning after a hearty breakfast, and you would be well dressed. By well dressed, I mean you would have perhaps two pairs of heavy socks and boots and perhaps overshoes over the boots to protect your feet, and heavy underwear, and maybe two pair of pants over that, maybe one heavy shirt or two shirts over heavy underwear, and a mackinaw or heavy coat over that, a silk skullcap and a heavy cap with ear flaps. And to protect your hands, which can get miserably cold with cold lines driving teams, you would use purse silk gloves and cover those with mittens. That’s the way you were dressed. Sometimes you would heat up a soapstone, if you were riding on a load, to keep your feet warm. But most people, most drivers would get down and stomp around and follow alongside the road with the team. This was something that had to be done. We knew no better, so we did it.

Another chore in the spring, after things began to dry up, was to repair some of the work—or, some of the damage, rather, done by winter storms. The roads in those days were usually maintained by the ranch men or the people. And they were paid the Customary wage by the county. Mud holes were filled, and the roads were repaired, and bridges, if need be, were repaired. There was usually a road crew supervised by someone in the district. And then another thing that was necessary was to clean out the main irrigation ditches, which [had] silted up to some extent during the previous year’s irrigating. Needless to say, irrigation was necessary because the principal moisture that fell in those areas, would come in the winter and in the spring, and most of it probably outside the growing season. So irrigation was always necessary for gardens,

plowed areas, and also for hay meadows, so that these ditches must be kept in repair.

The irrigation season usually started about the first of June. The ground stayed moist for that time. And, of course, there were the so-called stack yards, areas set on dry grounds through the meadows where the hay was stored for winter. These stack yards were usually cleaned up in the spring and fixed in readiness for the summer haying. Once the irrigation season had started, the rancher spent a lot of time on his irrigation. He also had to take care of his livestock. Many of the ranchers, particularly those with a number of head of cattle, had range rights so that the cattle would have to be taken out to the range and arrangements made to have them watched all during the summer season. Sometimes this was done by cowboys who hired out to do this thing and who lived right on the range in a cabin. But other places, like in the case of Ralph Little's ranch, we had less than a hundred head of cattle, and those were turned out, for the most part, on what was called the wood gulch area. And we had to do our own lookout for the cattle and for the horses, which were also turned out on the range.

All cattle and horses had to be branded with branding irons or had other marks, such as earmarks in the cattle. And this operation took place on the calves, which usually were born in the spring. But the branding operation took place about the last part of awe or early July, when the roundings would take place and the cattle were segregated and the several ranchers in a particular district would get together and brand, and de-horn, by the way, and earmark the cattle. This was a big chore. I was a cowboy, at least a would-be cowboy, part of the time.

Then when the hay was about ready to cut, perhaps ten days prior to the time the

first was cut, the water was turned off the irrigation ditches and the ground allowed to dry enough to hay. The haying season for the one-crop hay, which was grown in that area, started about August fifth to tenth and usually lasted through the first part of September. Hay varieties consisted mainly of wild hay, which was native, wire grass, plus redtop and timothy, and a clover called alsike clover, the latter a biennial which had to be reseeded almost every year. This hay, properly cared for, with the ground fertilized to some extent, with the alsike clover would produce as much as four tons per acre sometimes. But the wild hay seldom produced more than two tons per acre.

The haying process consists of mowing the hay one day, usually raking it not until the next day. With high altitudes, the temperatures were not high enough to cure it like in lower altitudes, the summer high temperatures getting probably no higher than eighty-five degrees at any time, and always with cold nights. The hay was windrowed then. The windrows were probably turned once. But hay was not hauled by manpower with pitchforks. The hay of the windrows was gathered up by what were called bull rakes, or go-devils, which pushed as much as probably six or seven hundred pounds at a time onto a stacker. And the stacker had teeth on it like the bull rake, but, of course, in the opposite direction. And when the load was placed from the bull rake onto the stacker, the entire load was lifted up to the haystack and dumped by the operator for the stacker team.

Running the stacker team usually was a job for children from ten to fifteen years old. Mowing the hay and raking the hay was a job I enjoyed thoroughly. There was something fascinating about it. There was always danger, of course, around a mowing machine on account of the sickles being very sharp, so

precautions were necessary. Ralph Little was extremely cautious and taught all people who worked for him about caution around the mower. Sometimes a few unfortunate things would happen. A chicken, for example, might be out in the meadow, and, unknown to the operator of the mowing machine, would have its legs cut off. Those were rather heartbreaking times for young people who might have a pet chicken or a turkey or a duck who succumbed to a situation of that kind.

Once the hay was put up, the stack yards were fenced to keep cattle out. Cattle and horses were pastured over the cut hay fields in the fall and winter, except, of course, when the snow in the winter kept them from utilizing the pasture. So they had to be fed. So those were the principal operations on the ranches of those days. Of course, there were numerous chores, such as filing corrals, filing barn doors, [and] filing up the cellar.

Agriculture was limited pretty much to raising hay, but a few things, such as red potatoes, the “early rose” variety, would mature. Picking the potatoes and storing those in the cellar, and a few vegetables such as carrots and beets could be grown and stored. Corn could not be grown in that climate. Our ranch had an elevation of about eight thousand feet. The Continental Divide was only thirty miles away—Monarch Pass. We used care in planting, of potatoes in particular, on account of frost damage. Frost could occur as late as June fifteenth. So usually, our potatoes were never planted ’til about the first of June. I recall one of our neighbors, Frank Dice, who planted according to the moon. He read the Farmer’s Almanac, and everything he did on his crop was done according to the phases of the moon, what he read in the Farmer’s Almanac. I don’t believe we paid much attention to that. And as far as I can remember, we had as good a luck as Frank Dice.

The Gunnison country, in that particular era, in the early and late teens, the early twenties, abounded in fish and game, trout in particular. The trout were not all native. The only native trout were the cutthroats. But cutthroats did not grow to great size. They were called black-spotted trout. The creeks were plentifully stocked with rainbow trout and eastern brook trout. In fact, there was a fish hatchery at Pitkin which supplied most of Gunnison County with fingerling size, which was the size usually planted.

Sage hens, or sage grouse, as they were sometimes called, were plentiful in those days. They fed on green shoots of clover, dandelions, and that kind of thing in the summertime, so that the young sage hens, during the—the sage season, which is late in August, were usually free of the sage taste. But the older sage hens would feed on the sage in wintertime when there was nothing else available. And it was almost impossible to eat one of those older fellows on account of the terrific odor and taste of the sage. However, a sage hen was an easy bird to kill, although it could hide successfully in the sage. But once it got up to fly, it was an easy mark for a marksman, and the supply became less and less. I’m not sure what is the situation today. But I recall my dad, Ralph Little, in later years when he was county commissioner, invited his political friends, and so forth, up to the ranch to shoot sage hens, much to my disconcert; I think the local supply was pretty much exhausted.

The higher mountains, which were timbered with evergreens, pine and fir, was a natural habitat for the blue grouse. And at one time, there was an ample supply of blue grouse. They were difficult to hunt. They were almost perfectly camouflaged, and if they didn’t move, you couldn’t distinguish them from a knot or a stump. However, they would fly up, but when they’re flying, though,

they become confused, and it's hard to tell in which direction they would go. I remember my dad at one time, we were going through what is called downed timber, where there was timber, logs, fallen across the paths, and so forth, which you had to get off your horse and lead your horse, to make your way through. We were looking for strays. And this particular day, we ran into a bunch of grouse. One of them became so confused he flew right at my dad. He simply stuck his fist out, and the grouse hit it (gesturing) and dropped at his feet. I can remember that incident very well.

Deer abounded in most of the area, but they had been hunted so frequently in times past that Colorado closed the season for many years, and there was no open season on deer for many years. Later on, the deer herds increased, and I believe this season was again opened. Also, up in the higher elevations there were mountain sheep. I never did see a mountain sheep. I know that they did exist. Elk also existed in one portion of Gunnison County, but that was far removed from my home ground.

Many of the ranchers in the earlier days didn't pay much attention to seasons. Deer meat was meat. And they would get the deer. Preserving was no trouble. There was no refrigeration, but we had natural refrigeration. The meat was simply hung up someplace where it would freeze, and stayed frozen 'til March. Instead of cutting steaks with a knife, you used a saw to saw the steaks off of the frozen meat. Frozen meat was always more tender than the other.

I soon became an avid fisherman. I was taught how to use a fly. [In] Boulder, Colorado I had done a little fishing with my uncle, but that was bait fishing. I was taught by Albert Sorensen, my neighbor, slightly younger than I was, how to use a fly. And I soon became quite expert in the use of a fly. The materials

used were very inexpensive in those days. You could buy two trout flies for a quarter. You could get a good line for a dollar, and you could buy a bamboo fish pole suitable for fly fishing for perhaps two dollars and a half from Montgomery Ward. [In] these modern days, to outfit with a fly casting outfit, a real good one with all your leaders, lines, tapered lines, and so forth, would probably run you something like fifty dollars. But I caught more fish in those days on it when the tackle amounted to less than five dollars than I have caught since with the high-priced tackle. However, the streams were pretty well stocked with fish, and it was no problem.

My dad liked fish—that is, he liked to eat them, but he was no hand to catch them. So usually, along in the evening, about time to milk the cows, there were still two hours of daylight. That was the time during the fly fishing season, when the fish are most apt to strike. He would say to me, "Now, Lawrence, I'll milk the cows tonight if you'll go down [and] catch me a mess of fish." Of course, I had no objections whatever [laughing]. And I did a lot of that all this summer and several other summers. I could catch as many as from five to about fifteen or twenty in the two hours before dark. The trout were both rainbows and eastern brook, eastern brook probably predominating. The creek was only four hundred feet from the house. I usually started right there and fished on downstream until dusk.

Cleaning the fish was my job. It was always the rule among the ranchers, whoever got the game or fish, it was his job to get them cleaned and prepared for the cook of the house. My sister Helen was also an avid fisherman. She did just as well as I did.

The subject of fishing reminds me of Mrs. McKinney. Mrs. McKinney ran a restaurant up at Ohio City, a place where you could

get a lunch and a good meal. She had two daughters, with whom I attended college later on. But Mrs. McKinney was an avid fisherman. Her garb consisted of whatever she happened to have on, usually the numerous dresses that women wore in those days, clear to the ground, and an old pair of shoes. She got right into the middle of the stream—dresses, shoes, and all, and did her fishing. But she probably was one of the best fishermen, or fisherwomen, in the whole district. She could fill her limit (which was fifty in those days) in probably a couple of hours going down Quartz Creek.

This day, I'm going back for a short time on some of the happenings at Boulder, Colorado. First of all, I think I'll mention something about Halley's Comet. To the best of my memory, Halley's Comet was visible in the summer months of 1910 perhaps for as long as ten days. As I remember it, it was plainly visible in the western part of the sky in early evening, and it had a long tail. And people used to sit by the hour and watch it. I believe its cycle is seventy-six years. So perhaps about 1986 it will again show. I hope to be around at that time. There was some superstition about Halley's Comet, too. Children at the age I was at that time were quite susceptible to superstitions and to hear stories from other children. Apparently, there was a rumor going around that that was soon going to be the end of the world. Halley's Comet was going to strike the earth, and we were all going to burn up. Well, so much for that.

I think I should say something about farmers and ranchers in that Boulder area, particularly my own folks. The principal produce on this Chase ranch was hay. But my dad had also planted a corn patch, that is, a field of corn, and some years he planted some oats. The oats and corn probably did

not amount to more than five or ten acres. The corn was harvested in the fall and used for pig feed, some of it without shelling; it was simply fed on the cob. And the oats, of course, were thrashed. In those days, there were traveling thrashing machines, which was the joy of all boys, to follow the thrashing machine as it came down the road pulled by a steam engine, and they set up—and (that is, the separator was pulled by a steam engine) then it was set up for the grains to be thrashed and the engine connected. That was always a great sight for boys.

The grain, as I recall, was sold to the mining camps, as was the hay—that is, coal mining camps. The principal coal mines were in the Lafayette [and] Marshall area. My dad hauled considerable hay there, and he received his pay in gold coins. I can remember when he brought the money home, he would put it out on the table, and we would all get a look at it. Gold was really legal tender in those days.

Eggs and butter, sometimes chickens (dressed), and sometimes ducks (dressed), and sometimes hogs (dressed), were sold in Boulder, Colorado, or traded, probably, at the Garvin store where the groceries were obtained. Surrounding our place were groups of small farmers, some of whom had small orchards and berry patches and seemed to eke out a living or part of a living from that, although they may have had other occupations. One man was a preacher, another was really a dairy farmer but he also raised vegetables and fruit. And, very much like my folks, they would trade the vegetables for staple groceries at the grocery store, or sometimes they would peddle these things from a regular peddler's wagon.

Speaking of peddlers, I might note at this point that there were quite a number of peddlers in the Colorado area in those

days and later. Most of those were said to be of Jewish descent, and the term “sheeny peddlers” was applied. They handled dry goods, in particular, dry goods and sometimes kitchenwares and other things which could be hauled in a covered wagon. That, also, was a great time for children. We usually gathered around the peddler wagons to see what they had and to see what we might coax our parents [in] to purchasing for us.

I think I shall say something at this time about the types of transportation. Practically all transportation, draying, especially, or any heavy transportation, was done by teams of horses or mules. And pleasure riding was principally still done in the buggies. Some of them were called phaetons, and then there were the top buggies with the lace on top, similar to [those] described in the songs in “Oklahoma!”

However, at this early date, there were a few automobiles. They looked very much like—at least some of them, like top buggies, with the narrow tires and probably a one- or two-cylinder engine. They would go putt-putt-putting down the street or down the roads, probably at a speed of ten to twelve, or fifteen miles an hour. I remember a Dr. Wright, who lived to the west of us, who drove one of these things.

One other time I can remember of a four-wheeled vehicle. It may have been a Chandler. I’m not sure. A man and his wife in his four-seated, four-wheeled vehicle with windshield but no top came out to visit at the ranch. It had regular automobile tires like the Model T’s and other automobiles at the time. My sister and I had the privilege of riding in this car from the ranch house down to the mailbox, about half a mile on the valley road, where we got out and we picked up the mail and came home.

Getting the mail was always a chore which was left to the children. It was a walk of half a mile to mailbox and a half a mile back. Being a boy interested in everything about nature, I really took my time in doing that and [would] be perfectly oblivious of the fact that I should be home getting my lunch. There were too many frogs, too many tadpoles, too many wild flowers, too many interesting things to look at. Then all of a sudden, I realized what [time] it was and would hurry home, and my mother was usually waiting for me with a willow switch. But regardless of how many switchings I got, I would repeat the performance many times.

I think something should be said about kinds of chores young children from age seven to ten or eleven would be assigned. [Boys were responsible for] feeding the chickens, ducks, other poultry, and the pigs sometimes, helping with the cleaning up of the barns, sometimes getting up in the hay mow and pitching hay down to the horses. Cleaning house was a girl’s chore, assistance with cleaning house. Washing and drying the dishes (there were no dishwashing machines in those days) was done by both my sister and me. Of course, there were other sample chores, such as turning washing machine handles, ice cream freezer handles, and doing some churning, also getting in the wood and coal. Fuel was principally coal, but enough wood had to be present to help get the coal started. To the best of my knowledge, there was no natural gas in the countryside at that time. Another chore, usually left to the girls, was to trim the lamp wicks and fill the lamps. Sometimes little boys were assigned this job, also. And on wash day and ironing day, part of the washing and simple ironing was done by the girls. And simple cooking was learned by both boys and girls. I learned to make oatmeal cookies along with my sister at a very

early age. I also learned to make pancakes. The making of pancakes is still a hobby of mine, and I do it quite often, especially on Sundays.

Being a boy, I was highly interested in the Fourth of July celebrations. To me, the Fourth of July was just one word which meant firecrackers and picnics. I recall how I loved to shoot the firecrackers and apparently was lucky enough to keep from getting burned or hurt in any manner.

One year, my sister and I discovered an abandoned gooseberry patch in the cow pasture. We told our folks about it. They took a sample to the Garvin store, and Mr. Garvin said, "Tell those kids to pick all the gooseberries they can. I'll take them all." We picked enough gooseberries out of that patch to earn somewhere between five and ten dollars, all of which we blew on fireworks. A pal of mine by the name of Elzie Bent lived to the north of us. The Bents usually put on quite a Fourth of July celebration with fireworks. This particular year, probably 1910 or 1911, we pooled our fireworks and had quite a celebration Fourth of July evening at the Bents.

I might mention that my mother was a Methodist. My stepfather had no particular denomination and was not inclined to be very religious in the sense that [it] was preached as religion in those days. Nevertheless, my sister and I were made to go to Sunday school. I say made to go because I didn't always appreciate Sunday school. However, it was a place to meet new boy and girl friends; we seldom missed a Sunday. There was a church just a little way south of us—no, that was—that was not south of us. It was east. It was a Nazarene church. But regardless of the denomination, we went there for Sunday school.

I recall one time after we were acquainted, we were asked to be boy and flower girl at the wedding of Elgie Dickensheets, the Sunday

school teacher. That was quite a performance. I think I stumbled on the way down the aisle and spilled some of the flowers. I was probably about nine or ten years old, and my sister was two years younger at the time.

The social life of adults and children in our particular area was limited to calling on Sundays or on some evenings, perhaps trading dinners or meals. But there were some other things of interest from a cultural standpoint. Boulder, being a university town, was able to receive quite a few things of educational interest. There was what was called Chautauqua held in a large building; they had some very fine programs, so I am told. I had gone to some of them, and my sister had with my mother, but we didn't always enjoy some of the more adult programs. I can remember, however, the things I enjoyed mostly were the drilling contests, where hard granite was used as the rock, and the contestants would be given so much time to drill by hand. Other than that, I do not remember much about the Chautauquas except a trip there by Billy Sunday, the evangelist. I can remember attending one of these meetings. Dad and Mother and Helen and I attended. I can recall that my sister, being about seven or eight years old, soon went to sleep. Billy Sunday was telling what would happen when he went up to heaven and his family came up one by one, he would call out their names. Apparently, he had a daughter by the name of Helen. When he came to that word, he yelled, "Helen." My sister immediately jumped up and wondered what it was all about. She'd been asleep.

Something should be said about the general countryside landmarks and vegetation of the Gunnison country. Really, the part I am most familiar with was the section in which we lived, which was about sixteen miles from Gunnison, and the area called the Quartz

Creek drainage basin was the one with which I was the most familiar. Quartz Creek headed above the town of Pitkin, ran on down the narrow gulch through a place called Ohio City, where it was joined by Gold Creek, which came in from the northeasterly. And from there, it flowed on down through the widened section of the valley on the westerly side to Parlin, where it joined the Tomichi [River]. From that point on to the confluence of the Tomichi and Gunnison, the stream bore the name Tomichi. The stream was of a milky white color when we first moved into the area, caused by the milling of gold and silver and lead and zinc ore. The mill tailings were run right into the stream, and the water was sort of milky. Nevertheless, you could still catch trout, although, as I recall, even the normally highly colored eastern brook trout were quite pale from having lived in that kind of water. There were very few floods, although there was very high water, usually when the snow melted in the spring, the high water usually occurring through the months of May and part of early June.

The little valley through which Quartz Creek ran was pretty well covered by ranches. Very seldom were there as many as two ranches side by side at right angles to the stream. This valley being narrow, there was one ranch after the other, you might say, in tandem. These ranches all raised hay and had pasture. Some raised a few early rose potatoes and gardens. The soil usually was good, and it was the result of decomposition of the granitic and limestone areas. The mountains there did not appear to be as high as mountains at less elevation in other countries because the bottom of the valley where we lived was about 8,000 feet to begin with.

Fossil Ridge, the upper part of which was above timberline, was off to the northeast, then Mt. Baldy, then several other mountains, the names of which I've forgotten. On the

more easterly side of the valley, there was a range the name of which I do not know. But across this little range was a hot springs called Juanita Hot Springs, which was quite a resort area. It was said to have radium water, which presumably was beneficial to certain people having certain ailments such as rheumatism. I doubt if this was more than a hypothesis because everyone felt better after getting in and out of that hot water.

The tops of the mountains, that is, the higher ones, were usually above timberline, and the snow stayed on 'til fairly late in summer. Below timberline, the forestation was principally pine and firs, Engelmann fir, known as Colorado blue spruce in some quarters. And there was huge quaking aspen groves in wet places. These quaking aspen took on beautiful golden and yellow hues after the first frosts, which occurred usually in late August and early September.

Below the timbered areas, practically the entire area was covered by sagebrush, *Artemisia tridentata*, which is the Nevada state flower, but western Colorado had plenty of it. In heavy alkaline regions, there was also what we called "buck brush," which would grow in these strongly alkaline spots, usually in lowlands where the drainage was poor.

Natural grasses abounded at high elevations. We think they called them "bunch grass." Foraging was very good for cattle and horses; however, there was a drawback. In some areas, aconite abounded. Aconite was very poisonous to livestock, especially when it was wet. So in some areas, range riders had to be hired through the summer season to guard against cattle eating aconite, and bloating up and dying. This season usually began about the Fourth of July and lasted through 'til frost in September.

Wild flowers abounded in the higher regions. The native flower of Colorado, the

columbine, could be found in huge stands from above timberline down into the timber, and sometimes right down to the bottom of the valley in the streams. However, after sheep were allowed to come into the country, a lot of the columbine stands disappeared. There were many forms of daisies, yellow and white, which bloomed late in the season. Early in the season, the very first spring flowers were the mayflowers, as we called them, which came up right below the snowbanks, and were blue color. But they didn't last very long. Then there were wild buttercups, or ranunculus, around the wet places, pussywillows abounded, and there were numerous so-called Indian pinks in the drier places along the hillsides. Sometimes there would be huge areas, also, of wild larkspur and some ground cover material such as sedum. The native plants and grasses had a value as forage in most cases, and browse.

The timber was useful in many ways, for fuel and for lumber, although the girth of the pine and fir' trees was not as great as in the northwest. Nevertheless, they were cut down, and the larger logs were sawed and made into lumber. The slabs—that is, when the log was trimmed and squared, the first cuttings which bore the bark on one side were called slabs. Sometimes, the second cutting under that was also a slab. The slab wood was not destroyed, but it was used for roofing sheds and barns. That is, one layer of slabs was laid down, and the crack which appears between, irregular as it was, could be covered by a second layer of slabs nailed over the top of those. Practically all of the houses, barns, corrals, and sheds were built from logs. The corrals and sheds were seldom chinked up to keep wind out. But the houses were well chinked with, usually, a lime plaster. Some of the barns were well chinked, and [in] some of the corrals, in order to keep the wind out, the cracks between the

walls were simply plastered with fresh cow manure, and this would act temporarily as a windbreak.

Fence posts, also, were made from these timbers. They were not treated. Thus, if there was no pitch to speak of in the post, it usually rotted out in a few years, which made a continual fencing problem. Most of the fences were the common barbed wire variety, usually with at least four or sometimes five wires for the fence. Most of the gates were made of poles—that is, the larger gates. But there were also many wire gates. The ranchers in the community thus made the best use they could of the native materials.

Crops were mentioned previously, but to reiterate, pasture and hay for winter use were the principal crops, and the livestock industry was the principal industry of the countryside. However, almost every family had a small garden. The things you could grow in these gardens were limited to the hardier vegetables, the root vegetables, like beets and carrots and turnips, and early potatoes such as red rose. The leafy vegetables, like spinach, Swiss chard, and lettuce would also do quite well. But it was impossible to grow things like tomatoes, corn, and eggplant due to the short season.

Animals native to this region were principally rodents and members of the feathered tribe, such as sage hens and grouse, and, of course, the migratory birds, such as robins, blackbirds, meadowlarks, and so forth [which] laid their nests there. Deer were plentiful at one time, and in certain areas there were said to have been antelope, but I believe all of those were extinct at that time. In one area of the country, there were quite a few elk. The prairie dog was very plentiful, and he was quite a pest to the ranchers. He would make his burrows in the edges of the meadows, and he would knock down the hay and utilize quite a lot of it. Badgers were

also quite plentiful. Coyotes were also quite plentiful at that time. Field mice and some rats—in the higher elevations, the pack rat was quite plentiful. In addition to the land animals, the beaver was native to the country, and to some extent, the muskrat, but both beavers and muskrats had been trapped, so the population had dwindled to a point where they had to be protected by law. There were a few snakes, no poisonous snakes. What we called a garter snake and water snake, were plentiful.

Trout and suckers abounded in the streams. The native trout, which were there, of course, before the white man came, were all cutthroat, or black-spotted trout. Eastern brook trout and rainbows were planted. The fish hatcheries emphasized eastern brook and rainbows. I don't recall of any black-spotted or cutthroat trout being raised in the hatcheries at that time. The fish hatchery at Pitkin supplied Quartz Creek, the Tomichi, the Cochetopa [Creek], and probably some of the Gunnison River. The fishing was extra good in all these streams and in the small tributaries, such as Alder Creek. There probably were limits on these trout, but I don't recall just what they were in the earlier days. I know that some people, including myself, could go up Alder Creek on horseback and catch as many as a hundred eastern brook trout, about six to eight inches long, and we thought nothing of it. Later on, there were limits. At the time I left for California, which was 1916, I believe the limit had been established at acre trout, none of which could be less than seven inches in length.

As far as ethnic groups are concerned, I don't recall that any people predominated, that is, any particular ethnic group, except the Caucasians. I believe the native Indians an that area were the Utes. But there were none of them, to the best of my knowledge,

around the Gunnison area at the time I lived there. Some Mexican people had come in. I remember one family by the name of Quintana that lived over on the Tomichi. They were very fine people, and the Quintana boys were very successful ranchers. I know of only one colored family. They lived in Pitkin, and they were called "Nigger George" and—I've forgotten her name, but I believe it was Josie. She used to smoke a clay pipe, and she was known for that. Those were the only colored people that I knew of. Some Italian people were in the area, but very few of them settled on the ranches. The Italians and Mexicans were used as section hands on the railroads.

In describing the people that lived on Quartz Creek, to the best of my knowledge, and going from the mouth of Quartz Creek and Parlin upward through Ohio City toward Pitkin, there were the Lobdels, part of whose ground was on the Tomichi and part on Quartz Creek. They also ran the Parlin store. And coming up the creek, there were the Collards, who had moved into the country with the Littles, and at the same time. They had a ranch of several hundred acres, and their cattle range was up the Alder Creek Company. Coming on up the creek, there was the Bain family. Mr. Bain was a widower, and I believe there were four girls and five boys in his family. I went to school with two of the boys, John and Walter. This was rather a small ranch, but they seemed to make a living. Coming on up the stream a little further, there was the Arthur Woodworth ranch. Arthur Woodworth was a bachelor. He was quite a character. He was from New York state in the county adjacent to the county where my mother was born. He used to come to the house and they would swap yarns about New York state. I can remember that very well. Arthur was a miner, as well as a rancher. He preferred doing the mining when he could

make any money at it. But he did manage to make a living in this little ranch. But he didn't know too much about how to go about it, and he was always up talkin' to my dad, getting advice. Next was the Sorensen ranch and the Little ranch, which had been a Sorensen ranch prior to my dad's purchase. The ranch on which we lived was known as the Sam Sorensen ranch, and ranch adjacent to it was the Charlie Sorensen ranch. Charlie Sorensen had three children, Pansy, Annie, and Elbert. Elbert was a fishing pal of mine. Annie died when she was a young girl twelve years old. They were of Danish descent (the Sorensens), and spoke with a lingering accent.

Going on up the creek, next to the Sorensen ranch was the Huff ranch, owned by Annie and Henry Huff. These people were not particularly well educated—you might call them the rough-and-ready type, and apparently were the butt of many jokes among the people of the creek. They lived in rather squalid quarters, and I believe the family were quite adept at swearing. Above the Huff ranch was the Frank Dice ranch. Frank and Cynthia Dice had come to this country in the early 1900s, probably about 1901 or '02, and settled on the ranch. They had four children—Eber, Lizzie, Hazel, and Forest. These people all were somewhat of a heavyset side. Eber was a good friend of mine. He had a saddle horse by the name of Prince, and I had one by the name of Nellie. We were continually racing each other, but my little Nellie was half Hambletonian and usually could beat him. These were the cowboy days.

Next, above the Dice ranch was the Ed Huff place. Ed and his wife had one child. Above that was the McLain ranch. John McLain and Mrs. McLain had three children, Floyd and Erma and Earl. I went to school with Floyd. Erma and Earl were still a little bit

too young to be in the school at the time I was going there. However, I believe Earl McLain later on became quite a famous engineer, but I don't know the exact circumstances. Above this place was a small ranch owned by a man by the name of Warner, who was quite a scientist, and who drove the first overland car I had ever seen. Above that was the J. N. Flick place. Flick was a man—presumably, he was a very knowledgeable person. People would go to him for advice on many things, especially on financial matters and on how to raise crops, and so forth. He had two sons and a daughter. One son, Homer, I knew very well, who later became a music instructor in Gunnison County High School. That was the last ranch before Ohio City, and I don't recall the names of too many of the ranch people above that except for Katie Munsch. Katie Munsch was a widow woman, I may have mentioned this before. She was a rough-and-ready character, apparently. It was said that one time she was married, but she and her husband didn't get along very well. She ran him up a tree with [an] axe and cut the tree down, at least that's the way the story goes. She was always dressed in overalls, except, in late years, when I was visiting back home after I'd been out in the world quite awhile, Katie Munsch was at our place, dressed up in women's clothes, and her gray hair was beautiful, and she was really a refined lady. I don't know what ever became of her.

Above that, there was a small place operated by a man who had come to the country as a consumptive. I believe he was a remittance man because he didn't have enough ground to really make a living. However, he was a wonderful carver. And he could use the soft quaking aspen wood, season it, and he would do some wonderful carving with that wood. I have forgotten the man's name [Mr. Dewitt]. I do remember a

sign over his gateway which said, “No-tel De Shack De Log.”

Above that point was the fish hatchery, a quartz mine, and then the town of Pitkin. Pitkin had been a mining town in the earlier days, but at the time we lived there, it was called a stick camp. That is, the principal occupation was felling small jack pines where they grew thickly, thus did not get much girth. These small trees were converted into ties used in the mining industry to support the rails.

Ohio City was at the confluence of Gold Creek and Quartz Creek, about seven miles below Pitkin, and its principal industry had been mining. The mines, which supported it, were up Gold Creek, and they were respectively the Carter mine, the Raymond, and the Gold Links. These were operating of f and on during the years of my stay in Gunnison County. Later on, in the early 1920s, after returning from California (from college), I hauled hay in the summertime to the Carter mine and to the Gold Links mine.

All of these people I have mentioned were probably mixtures of the white races. I don't recall exactly what they were, but probably mostly anglophiles. Some of them may have been of German descent, some of Scotch, some of Irish. But there were no people on Quartz Creek, in the ranches, especially, of Mexican origin, or of Negroid, or of southern European stock, to the best of my knowledge. Some of these people were real characters, as before stated, such as Katie Munsch and the Huff s.

The principal mode of handling freight in the Gunnison-Tomichi-Quartz Creek area was by means of the narrow-gauge D & RG railroad. (D & RG are the initials for Denver & Rio Grande.) This railroad (called the Pitkin Flyer) was in operation up to Pitkin three days a week at the time I lived there, and it

was later abandoned altogether. However, heavy wagons would also haul ore from the mines—that is, shipping ore down to Ohio City at a rail point.

The mail (a Star Route) was delivered by stage. The stage driver would start his route at Pitkin and drive fifteen miles downstream, through Ohio City, through the ranches, to Parlan. Then he would pick up the mail on the main D & RG line (which also was a narrow-gauge—that is, the Gunnison-Salida section) and would come on back and deliver to each of the ranches and to Ohio City and to Pitkin. I recall that our mailbox was a wash boiler nailed to a post with the open side toward the road. The wind usually came from the opposite side so that we seldom had snow mixed with the mail in the mailbox.

The man who ran the stage when we first came to Gunnison was a man known as Si, the mailman. I believe his name was Si Nesbit. He had a team of horses which he drove until such time as the Model T Fords came out. And after that time, he [drove] the Model T Ford. I'll say more about this later on, when 32 came back to college. However, a brother of his, by the name of Leonard Nesbit, came out from Missouri, probably about 1914, and assisted Si sometimes. But later, he got a teaching job, although I don't believe he had more than two years of high school. The teaching job was over beyond Gunnison. He came back to the Parlan area and worked in the summer for various people, including my dad. I recall the time when I left for California that Leonard picked a dollar out of his pocket (it was probably the last dollar he had) and gave it to me and wished me good luck.

Something should be said about community life—that is, social life. What there was, actually, was really centered around the schoolhouse. The schoolhouse served as a meeting place for

people. Of course, on certain holidays, such as Christmas or Thanksgiving, Easter, there usually was a school program. And at other times, if a dance were to be held, it usually was held in the schoolhouse, that is, the local schoolhouse. Sometimes, the larger dances were held in the hall up at Ohio City. Someone in the neighborhood usually could play a piano, and occasionally, someone could be found that would play a violin or a drum, to furnish the music.

I recall early in about 1914, Frank and Janie Collard; Frank had crossed from South Park to the Gunnison with Dad and the Collards, but had settled on the head of a little stream called Razor Creek, which came into the Tomichi from the south. His wife's name was Jane. They would call on us once in a while, and it was Janie Collard who taught me to dance. The dances in those days were the two-step and the waltz and the square dance—also the schottische. The foxtrot had not yet been developed.

The two-step was a sort of hop. Yet most of the young folks liked it because there was lots of action to it, and you moved around pretty fast. The waltz, in those days, was played more slowly, and it was impolite to back the lady. The man always did the backing. But you never backed a lady. Presumably, the reason for that was due to the length of the dresses they wore at that time. If you backed 'em up, they would probably stumble.

Sometimes these schoolhouse entertainments involved not only the students' program, but someone of the ranch families might be proficient in elocution or storytelling. I recall the Christmas trees that were used in every schoolhouse, and the decorations were principally popcorn strings and cranberry strings which were put together by the children. There were a few ornaments. Lighting was by candles, small candles, in candle holders. And what a fire

hazard that was, but fortunately, none of the schoolhouses to which I went burned down. Christmas trees in homes by the way, were also decorated with popcorn and cranberry strings, as well as a few ornaments. And, of course, the candles were burned on Christmas Eve or on Christmas Day.

Other social affairs, especially those that occurred in the summertime, might be picnics. I recall we usually had a Fourth of July picnic up at a place on Alder Creek, which was rather a difficult place to get into. About half of the people would ride horseback, and a few would ride in the wagons. The idea was to catch the fish so the young folks would go out early in the morning and catch the fish. There was always plenty of them there. And the chief item of diet seemed to be potato salad. Everybody brought potato salad. [It's] probably the cheapest thing they could get. Of course, there were pickles and some fried chicken sometimes, but principally fish.

In the wintertime, some of the young folks enjoyed sleigh rides, not hay rides so much, but simply get in a wagon box, as many as could get in there—ten or twelve, put the sleigh bells on the team, and probably travel a few miles. But everyone had to be bundled up for protection against the subzero weather.

Occasionally, earlier picture shows would come to Ohio City, and there would be a showing, and everybody in the valley would attend. This show would probably be one night. Once in a great while, there would be a band or a dance band of maybe four or five pieces come up from Gunnison for a dance or a big party in Ohio City. Everyone joined in on these parties, from the youngest child to the oldest grandpa. And even the old grandpas would get out and dance. So would the young children. We all had good times, good clean fun, and we always felt happier after one of these activities.

All ranchers usually ate very well. Potatoes was a staple diet. All kinds of meat which was raised by the ranchers, such as cattle, hogs, occasionally goats by some of them—those meats were plentiful. Fish and fowl were plentiful. Salads were made in the summertime only because it was the only time you could get lettuce and cabbage. [The] Gunnison area, being very cold, was not amenable to raising fruits, although some wild strawberries and gooseberries would grow. Most of the fruits came from the valleys around Montrose, Delta, and Paonia, and Hotchkiss. Peddlers would arrive beginning about June, the first fruits being strawberries and cherries, then would come the apricots, and later peaches, and finally pears and apples. Blackberries and raspberries and blackcaps also were delivered. Crates of the berries were purchased by ranchers, and boxes of fruit. The women would can the fruit in quart and pint jars and put it away usually in frost-protected cellars for winter use. I can recall in my own mother's cellar probably as many as two hundred jars of preserved fruits for the winter. Our diets were fairly well balanced with protein, minerals, and fruits. It seems to me everyone lived high on the hog, so the expression goes [laughing].

Artificial refrigeration was unheard of. Most ranches had what was called "coolers" put out in the open where water would drip down onto gunnysacks or a canvas, and the evaporation would help cool the butter and milk and eggs which were kept for everyday use. However, near where we lived, there was sort of a community ice house, where in the winter the men would saw the chunks of ice from the frozen creeks and would bring them in and pack them in sawdust. The sawdust kept that ice very well, clear through hot weather. The making of ice cream or use of ice or anything else that [you] wanted to be cooled in a hurry depended upon going to the

ice house, getting the ice, washing it off, and thus utilizing it.

Home lighting was something of a problem. In the earliest days I can remember, it was all done with kerosene lamps. Later, some of our lighting [was] by acetylene. The acetylene was purchased in the lump form, similar to the kind used in miner's lamps (called carbide). An excavation was made in which was imbedded a tank of water; automatic apparatus operated to drop these carbide pebbles down into the water, and acetylene gas would be generated. This acetylene gas pressure was regulated, and—it was transferred, piped, and, into the house wherever the lights were needed. Those lights—the burning part of the light had to have fastened to the aperture what were called mantles. Those mantles were probably made from asbestos, woven asbestos, and were preserved in paraffin so that the asbestos wouldn't break. When you first put the mantle on, you burned off the paraffin. Then as the gas came through, the mantle would become incandescent. It gave off a very good white light by use of the acetylene gas. However, they were fragile, and there were no covers over them. And at that time of the year when the millers were prevalent, they would sometimes fly through those lights and destroy the mantle. So you had to have quite a few of 'em to be replaced.

Heating was a problem in a large house. Some of the houses were equipped with stoves in several rooms. Our kitchen was a large room, and the kitchen range usually heated that area in very good shape. The other part of the house, the bedrooms, were left cold and were never warm anytime in the winter. However, the living area, sometimes was one room or a double room, was usually heated by a large stove. Most of those, in the earlier days, were the old-type potbelly stoves. Fuel

was wood and coal, wood used principally as a starter, but in the summertime, wood was used rather than coal in the cook stoves. The hot water was obtained from a tank attached to the cook stove. There was what was called a water back, next to the firebox. Heat was transferred from the water back to the water in the tank adjacent to it, the tank at reservoir. One of the principal chores of young boys and girls, when they were strong enough, was to carry water from the pump up to the house, left one bucket for drinking, one bucket for the outside wash basin for cool water, and the rest was filling the tank. That was an operation that had to be done more or less continually.

Then, too, when wash day came, usually there was a wash house (in our case, the portion of the old house) in which a wood and coal stove was fired up, and the wash boiler was heated, and other hot water, for the rinsing, and so forth. The washing process I can remember very well because that was one of the “small boy” chores that I had. First, there was the boiler on the stove, then part of that water was put into the main washing machine, clothing was separated by the womenfolk into the whites, then the coloreds, and the socks and overalls came in the last. They were run through a washing machine which had a handle on it which turned an apparatus back and forth which swished the clothes around. The Gold Dust soap, as I remembered the picture on the box (of the “Gold Dust Twins”), was used in there. Sometimes other kinds of soap were shaved and used if you didn’t have the soap powder. The only soap powder I can remember of in those days was called the Gold Dust Twins variety. That was done in the washing machine. Then they would be wrung out in the hand-operated wringer from that machine (after the clothes had been probably swished around there for fifteen

minutes or so) into a rinse water. Then certain of them were taken out directly from the wringer and put into the boiler to be boiled, especially white goods, such as sheets, and maybe some linens and other things, which had to be boiled with soap in order to get all of the dirt out. The rinsing water contained the other clothes, and they were swished around in that to wash the soap [out]. And many of them went through a process they called the bluing process, where a little—I’m not sure just what the bluing was composed of, but it was probably some kind of a sulfocyanate, or something of that kind, and that was used to prevent the yellowing of white goods, I believe. It seemed after you ran it through this bluing, the color came out more nearly white than it would otherwise. Then, of course, they were usually hung up on the line to dry. Sometimes in the winter they would freeze and stay there until they practically froze dry by the process of sublimation. That might take as long as a couple of days. So much for the washing.

The home appliances might be described. In doing the housework, the lady of the house had the common broom, the common mop, and the mop bucket, which had some kind of a device on it to squeeze the water out of it, or wring it. And she also had the carpet sweeper. The dishwashing was all done by hand. I cannot remember of a vacuum cleaner, nor automatic washers of any kind.

I might mention here that a couple of the items in every home were the Montgomery Ward [and] Sears and Roebuck catalogs. We all perused those, and that was quite a winter pastime. These catalogs were never thrown away. They had a use after they were obsolete, as far as the prices, and so forth, were concerned. They usually ended up out in the place known as the privy. And in those days, there was no such thing as toilet tissue, as I can remember.

HIGH SCHOOL YEARS

CALIFORNIA

I graduated from the eighth grade in the old Sparta school in 1914, and for the next two years attended the same school off and on in an attempt to get some of the higher education. This was a one-room school taught by one teacher. And this teacher, Margaret McLaughlin, tried to teach some of the high school subjects. We managed to get a little smattering of German, something of English, something of drawing, and she attempted a little bit about algebra, but we did not learn much, and I could not do much. But I wanted more education. My mother, also, was anxious for me to get an education, but my dad thought if I were to be a rancher, I had all the education I needed. I did not exactly want to be a rancher. My interests were not too much with the handling of cattle, although I did like to put up hay and bale hay, but I wanted to get more education.

At that particular time, about 1915, or early 1916, my Uncle Charles Peake and his family had settled in Bishop, California. And

my Uncle Charles ran the pool hall. His place of business was called the Pastime Billiard Parlor. He also had some other things going, and apparently my mother had written to him to see if there was an opportunity for me to go to school in Bishop and do something for my board and room and live with them. Eventually, this was agreed to, and I was prepared to leave the old home place and go to Bishop, California. This took place, I believe, about the middle of September, in 1916. I was to go by rail to Grand Junction, then through Salt Lake to Los Angeles, where I would be met by one of Uncle Charles's friends, who would take care of me until the train to Owens Valley would leave. Consequently, I left Parlin by train on the D & RG Railroad [in] mid-September of 1916.

The ride was very interesting to me. I had never ridden on the railroad very much, except we had gone to New York when I was a very young boy. I had to change cars in several places. The narrow-gauge railroad ran through Gunnison and on down to the Gunnison River Canyon and over the pass to

Montrose, where you change to broad gauge. The broad gauge took up there, went on down through Delta and Grand Junction to Salt Lake, all D & RG. At Salt Lake, I changed to the railroad called the Los Angeles and Salt Lake, which I believe was later part of the Union Pacific, and rode from there to Los Angeles.

It was interesting to me to observe the countryside during the daylight hours. I recall passing a bunch of cactus in one place in Nevada. But in later years, I tried to find that same area, and I'm not quite sure where it was, unless it would be the Delamar Flats, between Ely and Las Vegas. I recall the sight of my first palm tree. That was at the little tiny depot at Las Vegas. Outside of the depot were the palm tree and a few more buildings. There was nothing more in Las Vegas at that time.

I went on to Los Angeles and was met by Mr. Richard Steere, a friend of Uncle Charlie, whom, I believe, kept me overnight and put me on the train for Owens Valley. This, I believe, was the Southern Pacific. And it was broad gauge as far as a place called Owenyo, in the southern part of Owens Valley. From there you changed to a narrow-gauge and rode up the easterly side of the valley to a station called Laws, which was the railroad station for Bishop. My uncle met me there in his Model T Ford. The railroad was on the east side of the Owens Valley, where there was very little in the way of agriculture or population. All of the towns from south to north were on the west side of the valley, Lone Pine, Independence, Big Pine, and Bishop. I wouldn't be surprised but what some of the trainmen on that first ride of mine in Owens Valley were a couple of acquaintances or friends of mine in later years. One was Fred Balzar, the governor of Nevada, and the other was Charles Box, both of whom were trainmen on that Owens Valley line.

Our Uncle Charles and Aunt Nell had two children, Channing and Genevieve. At the time I arrived in Bishop, I believe Channing was about seven, and Genevieve, three or four. Channing was going to school at that time, I believe in either the first or second grade. Aunt Nell's maiden name was Devine, one hundred percent Irish descent. She was a fine little lady, and she always took the best care of me, as far as my doings were concerned, saw that I was in at night, saw that I had the same kind of comforts her family had.

However, I did discover one thing very soon. Ranch-hand food, the ranch style food, was not the custom with Aunt Nell. She cooked what, presumably, was ample for the family. But I recall being hungry. And yet I was too bashful to say much about it. And what little spare money I had, I would go down and buy candy and other kinds of food. But she was a good cook. But quantitatively [laughing], as far as I was concerned, it was not what I was accustomed to.

Channing, the boy, could make noises like automobiles, and he could also identify an automobile two blocks away before it was in view. He was a genius at that. I remember most about my little cousin Genevieve wanting to ride on my back. I obliged her. But I would get tired and want to put her down, and she'd say, "Now, Lawrence, don't you tease me." Of course, it was a matter of who was being teased.

Uncle Charles was a man probably in his middle thirties at the time I was in Bishop. He had this business. He was always very fond of games. He liked to play games, and he liked the business of games. So he was proprietor of this Pastime Billiard Parlor. One of his sources of income was a salesman's job he also had. He'd go up and down the valley selling Matthews candy, and he would also prepare punchboards with gold coins in watch fobs

and go up and down the valley distributing those.

Now, the kind of chores I was to do in order to earn my board and room were varied. Uncle Charles had a Model T Ford. I was to keep that spic and span, washed up and cleaned up. I was also supposed to take care of the yard. As I recall, it was a very small lawn. One of the most obnoxious jobs I had was cleaning cuspidors at the pool hall. Occasionally, I swept it out. One of the more enjoyable jobs was to use the jeweler's tools and fit the gold coins into the watch fobs after scrubbing them up and polishing them, fastening 'em on a display board, and typing out the winning numbers so that they were all ready to turn over to some pool hall or drug store or some grocery store up and down the valley. He would leave these on consignment, and whatever the profit was (that is, if there were a profit) would be split between the store operator and my uncle. As I recall, if all of the boards were punched out, the profit would be something like two hundred and fifty percent. However, if some of the larger gold coins were punched out early in the game, the board might go only twenty-five percent, and the profit would be nil, or it would barely break even. But as I recall now, most of the boards would have about sixty percent of the numbers punched out before the board became dead. By a dead board, that is one which didn't have enough coins on the display to entice the customers to do the punching.

Uncle Charles was an avid fisherman and sportsman. He introduced me to the trout streams in Owens Valley almost immediately, took me on trips up Bishop Creek, up into the Owens River country, and in other nearby areas. We probably took as many as four or five such trips on weekends before the fishing season closed in October. Fishing was really good in those days, and most of the fish were

either rainbows or cutthroat. And the limits, I believe, were about fifty fish, but I'm not sure. Later on, it was changed to twenty-five. I recall one time, my little cousin [Channing] wanted to go fishing and borrowed my pole. He ran across a skunk caught in a trap, and childlike, had to poke that animal with the fish pole. When he came home, a pretty sorry-looking and sorry-smelling boy, his mother, I believe, had to bury his clothes, and my fish pole smelled of skunk for quite some time. Channing had the usual paddling, which kids got in those days.

I shall now say something about one of the first friends I made, was Harry Guppy. He was a year younger than I, but he was starting as a freshman at Bishop High School. He lived only a few doors above the Peakes. And my first day in the school, I recall it was a little bit difficult because I was at some disadvantage having not been there when school started. Harry very kindly took me around, introduced me to some more of the kids and to the teachers. I can recall three of the subjects for which I signed up—English I, German I, and ancient history. The other one was a solid, but I cannot remember just what it was. I believe physical education was required of all students, and I was in that class. Bishop Union High covered the northerly end of Owens Valley, students coming not only from the town itself, but from the countryside, Sunland, the river country, and Round Valley. I believe there were about a hundred students in school. And as near as I can remember, there were seven or eight teachers. Mr. Lloyd Markham was the principal. Just prior to the year I had come to Bishop, the principal of the school was Tully Knoles, who later became the president of the College of the Pacific. He was there as a matter of health, I believe, and operated in Bishop only the one year. My German teacher's name was Ethel Bear, Miss

Ethel Bear, a maiden lady of probably thirty-five years. She was a native of Delta, Colorado, and she immediately became a good friend of mine. My history teacher's name was Miss Tillotson. My algebra teacher was Mr. Mealey. I don't remember many of the other teachers' names at this time, except Mr. Hall, whom, I believe, had the upperclassmen in science. There was a change in the teaching staff. I remember some of the teachers' names that I had [in] later years better than those in my freshman year, especially those with whom I had no connection, or no classes.

I had had enough German and enough algebra so that I managed to get along very well in those two classes, and did fairly well in English that year, and made quite a few friends. Some of my friends' names were Wilbur Bedford, and a young fellow called Phelps. We usually called him Phelps, and I can't remember what his first name was. There were some very brilliant girls in my class. One's name was Geraldine Mosher, whom I think later became a teacher. And Edith Cimmerral, the daughter of the principal of the Indian school at Bishop, and Minnie Leidy, and several others.

The principal thing I remember about my first year in school was attempting to beat Harry Guppy in algebra, which was almost impossible to do because he was just about an A-plus student all the way through. However, I do believe I did tie him with a grade in algebra.

Bishop Union High was a two-story building. As I remember, there were four classrooms upstairs, history, commercial, languages, and art. Downstairs, was the main assembly room and the chemical lab and the domestic science room. The basement contained the heating plant only. The school grounds were large, with a baseball and

football fields. Bishop had a small football team, but [they] were never too good as a team. I did not go out for athletics, but I did play tennis. I learned to play tennis with Harry Guppy and others, and when I had leisure, I usually played tennis. But my weight was only about a hundred and thirty pounds in those days, and I was not large enough to get into a football team.

At the end of the school year, my uncle got me a job on a ranch, about one-half mile south of Bishop. It was known as the Yandall ranch, and it was owned by a millionaire whose brother-in-law was placed there as a foreman. The brother-in-law's name was Van Velser. We always called him "Van" Van Velser, although I believe his name was other than Van. Nevertheless, we always called him "Van." The owner's name was Vogel, spelled like the German word for bird, V-o-g-e-l. His wife was the sister of Van Van Velser, who was a friend of my Uncle Charles. Thus I got a job for thirty dollars a month, I believe, in the hay field on that ranch.

At about the same time, my uncle sold out in Bishop and moved to Keeler, on Owens Lake, which was at the lower end of the valley. At Keeler, he built a new building called the Terminal Hotel. The name was applicable because that was the railroad terminal—one of the railroad terminals, that is. And he left Bishop while I was working on the ranch. I recall one day about the latter part of June, I received a telegram from Uncle Charles, reading something like this: "Lawrence. Pin your ears down. Tell Van good-bye and get down here as fast as you can." [Laughing]

lie had a job for me at the same rate, a dollar a day, at this Terminal Hotel. In this hotel, he had a boarding house and a restaurant. Swills and slops from the restaurant were fed to the pigs in the pen

about a hundred yards from the hotel, up in the brush country. There was a pump house from which local water was obtained for use in cleaning and washing only. Drinking water had to be transported from Lone Pine because all of the groundwater in the city of Keeler was impregnated with various kinds of salts, principally sodium carbonate. As a matter of fact, Owens Lake contained [an] almost saturated solution of sodium carbonate.

My particular kind of chores were something like the following: I would get up at about five in the morning and start the restaurant fires. I would then go out and start the pump at the pump house' and feed the pigs. After breakfast, which I had quite early, I would start the dish-washing routine. I was the dishwasher for the restaurant. I would clean those up usually by ten o'clock, at which time I would work in the drugstore, which was really not a drugstore, but he did sell patent medicines, and had a soda fountain. At one o'clock, I would start washing dishes again, and would finish about three-thirty. I'd usually go down to Owens Lake for a swim, come back and take a bath to wash the soda off, and prepare for the evening work, which was, again, wash the dishes.

Owens Lake was an interesting lake. It was so saturated with sodium carbonate that you could walk out to where the water was about three and a half feet deep, and you would start floating standing up. But if you had an abrasion on your skin, it would begin to smart right away. It was always necessary to take a bath in fresh water after getting out of the lake; that meant you walked for quite some distance, clothing, of course, partly saturated with the salts too, and you had to wash the soda from you. Nevertheless, swimming in the lake was rather fun, as long as you didn't get the water in your eyes.

This routine was pretty much a twelve-to fifteen-hour proposition, but I didn't complain. One of the enjoyable features, though, was to go to Lone Pine for the water. My uncle had a trailer fixed to hold fresh water. This trailer could be attached to the Model T Ford, which was used as a hauling vehicle. As I recall, it was sixteen miles to Lone Pine, over a fairly rough road. There was no pavements in those days, nothing but dirt roads. They were good where the ground was right, but where the ground was soft or sandy, you sometimes had trouble.

I believe I made the round trip to Lone Pine in about two hours. A humorous incident took place, in which I was the butt of the joke. I had taken care of my uncle's Model T at Bishop and had always pumped the tires up by hand. As far as I knew, that was the only way you could pump tires. On my first trip over to Lone Pine, Uncle Charles says, "Be sure to stop and get air in those tires when you go to the service station, and, of course, fill the tank up with gas," which I did. I stopped at the service station, got the gas, and pulled out a little ways and pumped up all the tires by hand. There were two fellows standin' there just laughin' to beat the dickens, and I didn't figure out what they were laughing at. But they never said a word about it. Later on, sometime later, I learned that there was free air at service stations.

The water from Lone Pine was used for drinking purposes only, possibly also for cooking in the restaurant. One thing I enjoyed at Keeler was the local Chinatown. Chinese were there because they worked in the two soda works. They had firecrackers for sale, and I enjoyed buying those firecrackers, and sometimes lighting 'em and throwing 'em at the numerous burros, who made quite a racket with tin cans and other rubbish around the hotel. The burros would become

frightened of the firecrackers, and that's one way I could shoo them away.

I forgot to mention what kept Keeler going. There were many things which kept it going—a very interesting country. Owens Lake was noted for its sodium carbonate. Two soda works were placed along the shore just beyond Keeler and another one on the westerly shore. I was quite familiar with the two near Keeler. Great dikes would be built in which the water was pumped from the lake and evaporated to the point where the sodium carbonate would start to precipitate. It was then brought in to tanks, and into those tanks was introduced streams of carbon dioxide by running the limestone through the lime kilns. The limestone was mined just a few miles away. The sodium carbonate was thus converted to sodium bicarbonate, which, being thus soluble, could then be filtered out for further treatment. It was washed and then heat treated and burned to the point where the end product was about, as I remember, sixty or seventy percent Na_2O , that is, sodium oxide, the balance being sodium carbonate. This product was shipped principally to Japan for glassmaking.

Another industry which kept Keeler going was the Cerro Gordo mine. The Cerro Gordo mine was in the mountains north— well, that would be the southerly tip of the White Mountain range, just north of Keeler. And an aerial tramway carried the ore from the mine down to the shipping point at Keeler. As I recall, this was a silver-lead-zinc mine.

Another industry was the Saline Valley salt works. Saline Valley was a dry desert valley within the White Mountain range where the precipitation was so low that salt beds were not dissolved and washed away. This salt was transferred by aerial tram for thirteen miles from Saline Valley over to a terminal point near Keeler, where it was loaded, then shipped away for further treatment.

Still another industry, somewhat local, was the Darwin mines. Darwin was located at the tip of Death Valley near the Uebehebe peaks. (Darwin is approximately thirty miles west of Death Valley.) I believe this was a silver-zinc-lead mine. There may have been some gold. The ore was hauled over those dusty, horrible roads by means of mule teams, which were fully the equivalent of the “twenty-mule-team Borax” teams that you've heard so much about. One of the teamsters, named Slim Wilson, stayed at the Terminal Hotel, and I thus learned quite a lot about his occupation while there.

The ore cars had metal wheels. I believe there were as many as five or six of these ore cars in the string, hauled by around twenty mules, plus a water tank, which always had to be hauled because there was no water between these two points, that is, no portable water. The peaks Uebehebe I mentioned were thus named because of their similarity to a plump maiden's breasts, Uebehebe being the Paiute, I believe, for maiden's breasts.

I made one trip to Darwin with my uncle. He had the punchboard and candy concession, which he kept in addition to the hotel. This trip was made in the Model T Ford. I believe we made the twenty-six miles in about two and a half hours, desert roads made almost impossible by iron-wheel tires of the ore cars. There might be as many as fifteen different roads. You could take your choice. They were all bad. And dust was so bad that everything, the Ford, your person—everything was just polluted with dust by the time you got home.

The principal industries in operation around Keeler have already been explained, but there was another which had a certain importance. There was a talc mill in Keeler. In this mill, talc, or soapstone, taken from a nearby deposit, the exact location of which I do not remember, was carved into insulators

for high voltage lines. And I believe the residue therefrom, the talc, was probably processed to some extent, but was sent away where part of it would go into the old-fashioned talcum or bath powder, some was used in the soap-making industry, [the] paper-making industry, and some, of course, ended up as what was called French chalk. Talc is hydrous aluminum silicate. As I remember, the chemical formula is $[Al_4(SO_4)_3NH_2O]$.

My stay at Keeler, as nearly as I can remember, was mainly during the months of July and August, although I probably was there a short time in June. Keeler was one of the warmest—in fact, hottest—places in which I have ever lived. I have seen the temperature in the shade as high as a hundred and twenty degrees. However, it was very dry, and you would not feel the heat as much as you would in a moist climate.

I recall some of the things which were growing around Keeler. There were very few. There was a scrub brush, which managed to survive in that extremely alkaline ground. And, in particular, I was interested in what I was later told was desert holly. There was not much of this, but I recall on my way to the pigpen to feed the pigs, there were a few bushes of desert holly. I thought it was a very beautiful thing to find out in that barren country.

As far as animal life, you wouldn't think there was much animal life in a place like that. But surprisingly, there must have been at least half a dozen varieties of the common lizards, and all kinds of insects. I believe most of the lizards lived on insects. There was also a large-type lizard called a chuckawalla. The chuckawalla, I believe, was herbivorous. Outside of the lizards, the chuckawallas, and snakes, which were said to be prevalent then, although I did not see any, I do not recall any other animals. Rabbits were not present, nor were deer or antelope, or any of that kind of

game. The area around the lake was extremely alkaline, very little forage, and the mountains were barren of trees in that particular area.

The kinds of people and their nationalities living in Keeler were interesting. There was quite a little section which we called Chinatown, the Chinese section. I recall going down there to some of the Chinese stores and buying trinkets and firecrackers. The firecrackers I used to scare away the burros when they were making noise around the hotel. And there was quite a Mexican settlement. The Chinese and Mexicans formed the principal labor force, working in that strongly alkaline water and about the soda plants.

One of the soda plants, I believe, was owned and controlled by the Watersons. The Watersons were quite famous in Owens Valley. They controlled the banking pretty well, and quite a lot of the industry. In later years, after I left the area entirely, the Watersons had overspeculated, the banks went broke, and it took a good many of the Owens Valley residents along with them. The losses were quite severe. Incidentally, I went to school with three of the Waterson boys, Paul, Whittier, and Jerome. Paul was the oldest of the three brothers, then Whittier, and Jerome the youngest, who graduated in the class of 1920 with me.

Come September, and I made my way back to Bishop for school. My Uncle Charles Peake had arranged with Van—van Velsor (I call him Van—I don't remember his first name for sure, but I believe it was Howard), such arrangement being that I would do certain chores and work in exchange for board and room. Money was pretty scarce in those days. I did receive a small amount every month or so, probably ten or fifteen dollars, from my folks back in Colorado, which paid some of my expenses—in fact, most of them.

The nature, the kind of work I found myself engaged in for this board and room was such things as taking care of chores like the fuel supply for the house and taking out the ashes, feeding and watering turkeys and chickens (quite a few of which were kept on the place), cleaning corrals, and occasionally helping the hired men in fencing, in repairing fence, and in irrigating.

A chore which I disliked very much, but which I had to do, usually on Sundays, was to take care of the sheep. There was a small herd of sheep run on this ranch, and during the fall and winter, they also pastured as many as two hundred rams from various sheep outfits around the valley. It was my job on Sundays to watch these sheep and keep an eye on them. There was a little dog, which was some help. I've forgotten the dog's name, but the only commands he understood were in French. He had belonged to the stepfather of the cook. And the stepfather was a Frenchman who spoke very little English. To get the dog to round up the sheep, I would say, "Allez!" To get him to come back, you would say, "Véci," which, I think is a contraction of two French words, venez and ici, meaning come here."

Upon occasion, also, when the milkman became ill, or during an interim when one milkman would quit his job, several of us would help do the milking. I had milked cows at home in Colorado, so it was nothing new to me. Later on, as I will state, I took care of the entire milking job in the summer of 1919.

The kinds of income from the ranch was sort of varied. I think the principal, steady income was from the dairy herd. The milk was separated, and the separated cream was sold to the creamery, the creamery man picking it up every day. Butchering of calves (veal) also brought in some income, and some of the crops, such as corn and grains, may have been sold. But I don't remember how that was

handled. Most of the forage crops, however, were used to feed the milk cows and horses and other livestock.

Seasonal operations in the Bishop area were pretty much like they are in any other climate, that altitude, and that latitude. Summertime was the crop growing time and harvesting time, which continued over into the fall. And wintertime was simply a chore time and taking care of such things as dairy herds, and springtime was time for planting the crops.

I'm discussing this ranch life, with which I followed through for several years, with but a single break. I'd like to, at this time, tell about some of the people on the ranch. First, the ranch was known as the Yandall ranch. It was sold to a millionaire by the name of Vogel, who did not live on the ranch, but had his brother-in-law, Van Velsor, as foreman to take care of it. Van had access to whatever funds he needed to run the ranch, and he was the boss. But I will say this: he was a very kindly man, and he treated me very, very well.

The ranch house contained two bedrooms, a living room and a dining room and kitchen downstairs. And upstairs contained three bedrooms and an area which was not quite finished. I had a room upstairs. There was a cook by the name of Mabel Brovo, a divorced woman, and she had a little child called "Pudge," a little girl, about two or three years old. Mabel Brovo was an excellent cook and housekeeper, and I thought a lot of her, and she treated me very, very well.

There was one hired man on the job in the fall of 1917. His name was Henry Koelker. I think he was of German descent. There was another man who worked about the ranch, in fact, took pretty good care of a number of items the year around. His name was Dave Yandall, an Indian man, who had been given a ten-acre piece of ground, I believe on the

northeast corner of the Yandall ranch. Dave did many of the chores and took care of the livestock and principally took care of the irrigation. Henry Koelker was a man perhaps in his late fifties, and he was quite a pal of mine. For amusement, he liked to play a card game called "cooncan." He taught me to play it, and I would play with him at this game for a good many evenings. He interrupted my studies sometimes. I was usually doing my algebra lesson, at that time, algebra II. And he would see me with some of the signs and figures, which he always called "fish hooks." - He said to me, "Quit playin' that fish hook game for a while and come over and let's play cooncan." It didn't take much urging for me to do it.

There were frequent visitors to the ranch. Mabel Brovo's mother and stepfather and some of her relatives were frequent visitors. And also, occasionally, we would get friends of Van's. At one time, the owner himself visited the ranch in his big Mercedes car. The Mercedes car at that time was supposed to be the last thing in cars. Made in Germany, it had an aluminum body, aluminum being very expensive, and I was told the cost was in the neighborhood of fifteen thousand dollars. I was offered a ride in a Mercedes and certainly took it up. Along with Mr. Vogel came a friend of his, whom I was supposed to take out hunting (I believe this was the fall of 1917), [and] show him where the doves were, which I did.

This man was an excellent shot. Re brought down his limit of doves in a very short time. Re then asked me to prepare and clean them, which I did. And my thoughts at the time was, "Well, now, here's a wealthy man, I'll bet he will give me quite a nice tip." I cleaned all those birds and took 'em up to him and gave 'em to him. He took them over,

said, "Thank you." That was it. Dave Yandall, the Indian fellow, was married and had several grown and half-grown children. His wife did the washing. Indian women were called "mahalas." I can recall this gentleman whom I helped out on his hunting expedition asking about the laundry. And he said, "Could you get Matilda-ha to do my laundry?" The name "mahala" hadn't quite rung a bell with him.

Dave Yandall himself was quite a character. He was a heavyset man and did his work quite faithfully. He took a liking to me and would tell me many of the stories and Indian lore that he had learned about from his forefathers. He told me of several stories, one of which I think is worth repeating. That was about the first experience of the Indians with the white men. The white men came into the lower end of the valley at first, and they had horses. The Indians eyed those horses and decided they would make good eating. And believe it or not, they went down into that area, rounded up the horses on foot, and drove them, on foot, the full sixty or seventy miles, clear up into the northern end of the valley, which is called Round Valley. And they had a big feast. However, those white men soon stopped that.

He would also tell me much about the food of the Indians. He said the food of the Indians was varied. He said they ate mostly meat when they could get it, the meat consisting of deer, when they could kill them, and ducks, for which they would set snares, and sometimes would shoot them with bows and arrows, and, of course, fish. They did not fish like the white man; rather, they would wait until the spawning time when the big fish would go up into the small streams and they would catch them there by netting and with their hands.

Another meat diet of theirs would sound quite peculiar nowadays. That was the

piaggi. The piaggi was a large white grub that inhabited the pine trees. The Indians would pull these out, dry them, and make gruel and stew from the piaggis in the winter.

Pine nuts, also (the soft-shell pine nut), was a staple diet with the Indians. Of course, some years, there were very poor crops. Another food was called "taboose." Taboose grass looked something like slough grass and would grow in the sandy places. It was a rather shallow-rooted grass, but there were small tubers [which ranged from] about the size of large peas [to] perhaps some of them as large as the end of a little finger. These could be easily dug by hand, and I have enjoyed taboose nuts myself. If you dig them out by hand and scrape off the outside cover, they tasted very much like hazel nuts.

Dave also told me some things his grandfather had learned from his grandfather, and so forth. "A long, long time" said Dave, "there was a great big rumble and a roar." And, he says, "The whole ground was going, 'woo-woo-woo-woo-woo.'" He was probably describing an earthquake as it was described to him. And, he says, "The water in the lake (he was talking, no doubt, about Owens Lake) went clear down." He told me that that was what happened, and that some of his people lost their lives in this big shake. I do not know when that could have taken place. It probably was a few centuries prior to the time I lived in Bishop.

In turning to school days, in the year 1917-1918, my sophomore year, I took Algebra II, English II, medieval history, German II, and an art class. My Algebra II teacher was Mr. Markham, the principal. Miss Bear taught English and German, and a young lady by the name of Miss Parrish taught medieval history. Art was taught by a Miss Ruark. I believe I had made four and a half units. I don't recall that we had physical education in

high school. We did have occasional exercises, and we played tag football, and occasionally baseball and basketball during the noon hour. There was no gymnasium, although Bishop did have a football team. Its opponents were few and far between. I recall that they did play Tonopah and perhaps Big Pine. But I believe, for the most part, the other Owens Valley towns were not large enough to support football teams. Basketball was played out in the open, but there were no games other than interclass games because there was no gymnasium. Sometimes, some of the students played tennis. I did this when I could borrow a racquet, not having a racquet of my own. There was no music in the school except during some of the assemblies. If someone could play the piano, we would sing old-time songs, usually led by one of the teachers.

Clothing worn by the students in those days, most of the students being farm people, were blue jeans or what we would call slacks nowadays, shirts, and sweaters. The girls' dresses were about ankle length, as I remember, but not very colorful. It seemed the clothing in those days was rather drab in comparing modern day colors. Some of the girls who lived in town were more or less better dressed than the girls from the country, and sane with the boys. My own wardrobe consisted of one suit and probably one or two slacks and overalls, plus two or three shirts and the necessary socks and underwear, and probably one pair of shoes for best and one for everyday use, and another for use about the ranch.

I maintained friendship with Harry Guppy all through my sophomore year. And occasionally, on certain Saturdays, I would receive permission from Van to go with Harry hunting ducks, or possibly catfishing or trout fishing. Harry drove an old Overland car with the hard tires, and it seemed to me we

were spending most of our time fixing tires. Having three blowouts or flat tires per trip was nothing unusual.

I might mention at this time the kinds of automobiles on the market in those days. There were not many, and there were not many people who had autos. I believe the Model T Ford took first place quantitatively. Then there was the Franklin, an air-cooled car, Studebaker, Chandler, and Hupmobile. And a little later, the Buick, the Star, and the Nash came into being.

I might say something about amusements. Townspeople probably had their own variety of amusements, but not living in town, I am not familiar with what kinds of parties or what kind of social life they had. The country people would come to town principally to see the picture show, or probably to a celebration, such as a Fourth of July celebration. But they usually had their own kinds of amusement, such as get-togethers and picnics and small rodeos, and just trade-off calls.

Near the end of the school year, in 1917, I received a request from my folks and enough money to come back to Colorado to help with the haying. That was during World War I, and help was hard to get. Also, my mother felt it was necessary for her to go back to New York state and visit her folks while they were still alive, especially her father and mother. Her two sisters and one brother, of course, were still alive.

The day I started to buy my tickets for the train trip back to Colorado was the day the federal government took over the railroads. Tickets could be bought only to division points. My first ticket was on the narrow-gauge railroad from Laws, the Bishop station, to Nina, Nevada, where the broad gauge took over. I could buy another ticket from Nina to

Reno. I had to stay all night in Nina. Instead of going on to Reno, which, to my boyhood knowledge was a very wicked city, I thought I'd better stop over at Hazen because the train would come back through that way, which I did. I stopped over at Hazen and probably waited there five or six hours in that more or less God forsaken place for the train to go on through. I also managed at Hazen to buy fare on the Southern Pacific, which took me to Ogden. I stayed all night in Ogden, and the next day could buy a ticket which first took me through Salt Lake, and then from Salt Lake to Grand Junction, Colorado. In Grand Junction, I bought another ticket, which took me as far as Montrose, Colorado. In Montrose, I bought a ticket to my home near Parlin, Colorado, on the narrow-gauge. I was met there by my dad and sister in, I believe, the little old Buick-4, which my dad had purchased while I was away.

I spent that summer, almost altogether, on the ranch helping with the irrigation and other summertime chores, and when the right time came along, I helped with the hay. My dad and sister, with the help of one man, put up the entire crop, about two hundred tons. My dad did the heavy work, such as stacking the hay. My job was principally mowing and raking. I used different teams at different times. I had one runaway with the mowing machine, but the horses got bogged down in a soft place and managed to stop before too much damage was done.

My sister ran the stacker team, but she also was the chief cook and bottle washer, so to speak, in the absence of my mother. She was a very good cook. Helen was two years younger than I. She was also a very good horsewoman, both with teams and with saddle horses.

I believe I had but a few days to myself in which I renewed old acquaintances up and down the creek. But about this time, one of

my best friends, Eber Dice—perhaps it was a little later than this summer, [had] passed away. Eber and I, in previous days, used to be cowboys together. He had a horse by the name of Prince, and I had one by the name of Nellie. We would race every once in a while. My horse, Nellie, was half Hambletonian, and she was very swift. And I usually beat Prince by two or three heads in a quarter of a mile.

During the late part of the summer, after my mother's return from New York, we were visited by her youngest brother, Will Peake, and his wife Carolyn, and two little daughters. They stayed with us, I believe, about a week, and then Uncle Will's family decided to go to California. As a matter of fact, I believe my Uncle Charles at Keeler had asked Uncle Will to come out and help him work at the hotel. We all left together probably one late day in August. I believe the school started early in September at Bishop. I remember the ride on the train very well because soldiers were on all the trains and at all the stations. The ride was uneventful, and this time, we were able to get tickets clear through to our destinations.

When we got to a place in Owens Valley, I believe called Owenyo, my uncle and aunt and family changed cars to a narrow gauge which took them on to Keeler, about sixteen miles. I continued on to Laws, where I got on the stage and returned to my temporary ranch home at Bishop.

My high school years, especially my junior and senior years, were spent during World War I. I recall the slogan in those days, "Hooverize." I think that has something to do with wartime economy where certain things were in scarce supply, and we had to "Hooverize" (to economize) on those things.

I went back to the same ranch house with the same people, Van and Mabel, the cook. But this time Van's boy, Russell Van Velsor,

was present. And he and I became close friends, more or less pals, although he was about two years younger than I. During the fall of '1918 (I believe I'm right on the time) was the time when that terrific influenza epidemic struck the country. And Bishop was no exception. Schools were closed, churches were closed, people who could serve served in the temporary hospitals, and I recall that on our way to town, or whenever we were with other people, we had to wear a muslin cloth over our nose. Whether or not it kept out the germs, I wouldn't say. It probably did not. I also recall that quite a number of my school friends caught the disease, and seemingly, the huskiest, hardiest ones were the ones who passed away. This epidemic, as near as I can remember, must have lasted almost a month. None of the people on the ranch contracted the disease at this time.

Come holiday time, I was allowed to go down to Keeler to spend the time with my two uncles and their families. This I enjoyed very much. The weather at Keeler in December was much more invigorating than what you would get in the heat of summer. We made some little trips around in Uncle Charles's Model T Ford, trips I had not taken before. And I enjoyed doing a few chores about the hotel for the week or so that I stayed there. Of course, I made trip both ways via the narrow-gauge railway. Quite a little fun was made of that railway. They called it the "Slow, Slow Route." They made remarks about some of the people carrying their shotguns along and would hunt jackrabbits on the way and then get back on the train. They could usually outrun the train.

Later on in the winter, or perhaps early spring—however, I believe it was in February, three of us came down at the same time with the influenza. I recall that the milker had come down some little time before that, and Van and his boy, and I believe another man

who was present there, and myself, we all did the milking and took care of the dairy work. When I came down with the flu, I recall the time I was milking a cow, and all of a sudden, I became very weak and faint and had a high fever. I could hardly get into the house.

Miss Mabel Brovo was a real charming person, not only charming, but she loved human beings, and she took excellent care of Russell and Van and myself. She nursed us through that. Of course, we had medical attention, but I don't remember what kind of medicine we had; the doctors didn't know what to give, so I guess it was some common remedies. But mainly, it was rest and care. I believe we were all down for about two weeks. But apparently, this siege of the flu was not as severe as the earlier one. All three of us pulled through, but thanks mainly to the help of Mabel Brovo. Fortunately, Mabel and her little daughter did not contract the disease.

About this time on the ranch, things had happened between Mr. and Mrs. Vogel. Apparently there was a divorce. And Nan Vogel, Van's sister, arranged for some changes. She had her other sister, Frances, and her husband, whose name I cannot remember, come up from Los Angeles and spend, I believe, the month of May and quite a lot of the summer helping out on the ranch. These people knew nothing about the ranch. In fact, they knew less than Van himself, who did not know too much about ranching. Nevertheless, they tried, but the mistakes they made were numerous. I recall the pigs getting out. No one tried to get them back in. Those pigs rooted up an entire alfalfa field looking for taboose grass.

I believe at this time, Mabel Brovo, the cook, left. In fact, I'm sure she did. I believe she was discharged by this new crowd who came in. Incidentally, they brought a cook with them, a colored lady by the name of

Laura. Laura was quite a character. I enjoyed talking to her. She told me about some of her experiences. She also was an excellent cook.

It so happened, about the end of the school term, that the steady milker was drafted, and there was no other milker available. Having milked cows of f and on all my life, I took the job. The job paid seventy-five dollars a month and board and room. This job kept me occupied the entire summer. I spent every day, Sundays, Saturdays, holidays, and all, except one-half a day (which was the Fourth of July), with this particular job. In addition, I had helped make the garden in the spring, and I convinced the people that sweet potatoes might grow in that area, and we planted about an acre of sweet potatoes and yams in addition to the other garden. Since I had planted this garden and I didn't see anybody taking very good care of it, I took it upon myself to care for the garden in addition to my milking job.

My milking job had a routine something like this: I'd get up at three o'clock in the morning, bring the cows in from the pasture and get them into the stanchions in the barn. They were not fed anything in the summertime; all the production came from grazing. You would then milk, and as I recall, there were twenty-three cows in the herd when I started the job. Six or seven young two-year-old heifers came fresh and had to be taught to go into the stanchions later on in the summer. So I probably ended up with pretty close to thirty cows. The milking usually was completed by about perhaps thirty-thirty or seven o'clock, at which time breakfast was ready. I would turn the cows out back into the pasture and go in to breakfast. Right after breakfast, the milk would be run through the De La Val separator, and the cream can placed in readiness for the creamery man to pick it up.

After the milk was separated, the next chore was to feed the calves, which were fed separated milk, and feed what was called the “leppy lambs.” These leppy lambs did not drink the milk directly from the bucket like the calves, but had to be fed with bottles. The reason they were called leppies probably is because they were orphans. The ewes usually had two lambs, sometimes only one. When they had two lambs, they very often refused to take one of them. That one had to be raised, ’til it was about half-grown, by hand.

After feeding the calves and the leppy lambs, the next chore was to wash and thoroughly scald the separator and leave all the parts out in the sun (that was a requirement of the California State Board of Health) and thoroughly clean and disinfect the floor of the milk house, then go out and thoroughly clean the barn and wash it down. Inspection was made by the California dairy inspector about every three weeks. I managed to pass every inspection.

This took care of the morning. After these chores were done, which was probably about nine-thirty, I would go back to bed and sleep ’til noon. After lunch, I would sometimes go down to the canal for a swim or would work out in the garden. I took pride in working in the garden. I remember raising nice sweet corn, peppers, eggplants, tomatoes, and many other things which I could not raise in the cold weather of Colorado.

At three o’clock in the afternoon, the routine was repeated. The cows were gotten in out of the pasture, milked, the milk was separated, but the separator was not washed. Hot water, scalding water, was run through it, but it was not washed after the night separation. The calves, of course, and the leppy lambs had to be fed just the sane. The cows were again turned out into the pasture for night feeding.

At this point, I would like to give a little character sketch of Laura, the colored cook, brought in by Van’s sisters. Laura used to confide in me with her troubles, and she told me something about her early history. She liked warm milk, fresh from the cow. So sometimes in the evening, she would come out to the barn where I was working, and I would milk a cup of fresh milk into a cup for her, and she would stand there and talk to me. She said, “You know, Ah wuz raised down South, an’ I used t’ wuk in dem cotton fields, an’ you know, dat’s what made me change mah colah. Ah used t’ be amos’ white. But now, you see wha’ happened t’ me? It was workin’ in dat heat and dem cotton fields.” She says, “Mi used t’ wuk ha’d in deni cotton fields. And Mist’ Little, Au got a daughtah down der. She’s in Flōda now. She’s one a’ dem sportin’ gals...” Laura left out all of her r’s. Practically all of them, but the one word she simply...put an r into was pheasant. To her, the word pheasant was “phreasant.” Shēd say, “De boys went out fo’ dam phreasants today...”*

Laura was a great pancake cook, and Russell Van Velsler and I one time had a contest. I think we had done quite a few chores. I believe this was just after the tall semester started in high school, and another milker was on the job. But anyway, we had done quite a few chores and had worked hard, so we decided to have a pancake-eating contest. Laura baked I don’t know how many pancakes. I can’t remember the exact figures now, but I believe Russell and I consumed Somewhere around twenty pancakes apiece.

*Ed. note: Due to a tape machine malfunction during this session’s recording, this portion of the tape was only partially audible and consequently small sections have been lost.

Going back to the early summer of 1919, about the time I took over the milking job, there arrived on the place Nan, whom I believe was the younger sister of Van, and Nan had been the wife of Vogel, the millionaire. Nan arrived with her boyfriend, whose name was Max. I don't remember what his last name was, but we called him Max. And at that point, her sister, Frances, and husband left for Los Angeles, where the husband resumed his duties as an officer of the law—or rather, a cop.

The Indian, Dave Yandall, acted as foreman on the ranch at the time, and it was a good thing he did because Nan and her boyfriend, Max, knew practically nothing about how to run the ranch. Of course, I took care of the milking, and I think during the summer, that was about the only income that was available, although Nan, I believe, had quite a bit of money from her separation.

Another thing that happened during my stay there I must mention. I believe Prohibition went into effect about the first of the year in 1919. But somebody—maybe it was 1920, I can't remember the exact year. But I know that there was a tremendous supply of liquor brought up from Los Angeles and stored upstairs. I never touched the stuff. But that didn't last long. And later, in the summer of 19—or perhaps the fall of 1919, the liquor supply was exhausted, and I came home from school one day, and I was still a couple hundred feet or so from the house when the odor of lemon extract was very prominent. Well, Max apparently had purchased a still and bought a considerable amount of lemon extract and had been distilling it off to get the alcohol. I don't know what kind of a concoction resulted, but apparently, it must've been quite potent.

I was quite disgusted with the way things were going because the ranch was not being

properly cared for, and I think, realizing this, failed to do as much as I could because it didn't seem to be doing much good for anyone, and I was reprimanded by Nan for not doing my share. However, at the same time, I had been elected as editor of the high school annual. That was taking quite considerable of my time. So I thought it best, if my folks would agree to it, to take board and room in Bishop, where I would have more time to devote to the annual and wouldn't have to work every day. As a matter of fact, Mr. Guppy helped me in this. He had been working out there at the ranch, doing some carpenter work, and had noted the situation between Max and Nan, and apparently reported it to his wife, who, being a strict Methodist, thought I was living under some rather bad conditions.

I had arranged with my folks to give me a supply of money which would probably last me through the school year. So about the end of the semester, I left the ranch and went to live with the Guppys for the remainder of the school term. The Guppys were quite religious people, and they managed to get me to attend the Methodist church services, which I did. I hadn't attended church services at all, or very seldom at least, during all the previous years at Bishop. So my last several months were spent living in town with the Guppys. Harry and I did some work together on some of the Saturdays, particularly for Mr. Hall out in Sunland (Mr. Hall was our chemistry teacher), where we grubbed raspberry bushes and where we grafted new kinds of apples into the stubs of the old trees, and we did some miscellaneous work. We also grubbed out some huge cottonwood stumps for a lady in town. Also, to add a little income, I sometimes helped Mr. McLaren, the janitor at the high school, after school, cleaning floors.

Harry had one sister, Eileen, who was probably four or five years older than Harry.

Eileen was a beautiful, blue-eyed girl with peaches and cream skin. The fact that she was quite a lot older than Harry and me, although I liked her, she was clear out of class, because in those days (probably any day), someone several years older seemed out of the question. Eileen had had a sick spell when she was younger which kept her out of school so that she was only a couple years ahead of Harry in high school. And during this time that I stayed with the Guppys, she was a student at the University of California. She returned from college prior to the time I left Bishop.

Leaving Bishop after graduation was kind of a sad experience for me, saying good-bye to my old friends and acquaintances. The Guppys took me over to the train at Laws. I can't remember the exact date. But I went again over the same old familiar railroad routes to Parlin, Colorado, where I was met by my folks.

I have not said very much thus far about my last two years at Bishop Union High School. The subject matter in my junior year consisted of plane geometry, English III (by the way, Mr. Markham, the principal, taught me plane geometry), and I had English III under Miss Ethel Bear. I took [an] agriculture course, which I much enjoyed, taught by Mr. Savage. I took French I under Miss Ruark, and I took chemistry under Mr. Hall, five solids. I managed the five solids fairly well.

(In] my senior year, my studies included English IV, again under Miss Bear, French II under Miss Ruark, American history and civics under a Miss Parrish, physics under Mr. Hall, and a solid year of math, consisting of solid geometry and trigonometry, under Mr. Savage. This, again, was five units. I graduated with eighteen and a half units. And possibly, some credit was given for physical education, although I didn't recall that physical education was required in those days. My average for my four years of high school was approximately

a B, which was between about ninety and ninety-five.

My high school years were almost void of social activities, as far as I was concerned. Working for board and room caused me to miss many of the social functions. I don't believe I ever attended a dance, except the junior-senior prom. And I was so awkward at dancing that I was bashful. However, I had learned to dance years ago in Colorado. But I did not know how to do the fox-trot. I could waltz a little bit. Also, I did not take an active part in student extracurricular activities for the same reason of having to work. I did manage during the noon hours to enjoy some of the athletic events that we put on as students among ourselves, such as class basketball games, baseball games, and tag football. And we used to practice broad jumping. The one and only one thing at which I excelled athletically was the hop, skip, and jump. I could just about outdo anyone in that particular feature. But -I was certainly not very good in football and the other things. I was not very husky in those days. I think my average weight through high school was from about a hundred and thirty to a hundred and forty pounds.

I was supposed to have a part in the senior play. It just so happened that about the time the last several practices took place, I developed a throat condition and a hoarseness which was so bad that I could not speak at all. A substitute from the junior class had to take my place. In a way, I was rather glad of it because I was somewhat bashful and didn't much want to take the part that I had, although it was a minor part [laughing]. The hoarseness certainly wasn't brought on purposely. It just so happened

In addition to the agricultural activities around Bishop, there was some mining activity. Tungsten was discovered in several areas. One of my schoolmates who had

graduated several years before I did, by the name of Joe Riley, worked in one of these mines, as did several of the other young men I knew. Later, the Climax Molybdenum Company, I believe, and several other big companies mined tungsten at the higher elevations at the head of Pine Creek, and possibly the Rock Creek area, also. These became big mines and big producers of tungsten in later years.

One important thing that happened, perhaps two, during my sojourn at Bishop, California was the building of the Sherwin road and also the paving of a narrow strip of the road between Bishop and Lone Pine with Portland cement concrete. In later years, I became well acquainted with C. C. Boyer who, in those later years, was an engineer with the state Highway Department. And from his discussion and descriptions, I learned a lot more about the early work on the roads around Bishop. And he was actually the engineer who rebuilt the Sherwin grade and also who put in the Portland cement concrete road.

The old Sherwin grade was rather a steep grade which led from what is called Round Valley up over a summit (I believe they call it the Rock Creek summit), which eventually went into Long Valley and the headwaters of the Owens River and the great High Sierra recreational area, such as Convict Lake, Twin Lakes, and the Mammoth country. C. C. Boyer did this work on the Sherwin grade with rather primitive equipment, as we think of equipment nowadays, horse-drawn or mule-drawn—"slips," as we called them, and "Fresnos" (plows), and horse-drawn graders. I believe near the end of World War I, they did get a few government surplus trucks and possibly some mechanically operated equipment.

One other event which occurred after I left Bishop had to do with the so-called "Water

War." Los Angeles was seeking more water for the rapid growth of that urban area. They decided to take over the entire flow, if they could get it, of the Owens River. A big dam was to be built up in Long Valley, near the headwaters of the Owens River. And down at the lower end of the Owens River, a canal would carry the water from that point to where it would be distributed in Los Angeles. Work may have started on this canal before I left Bishop, but I did not hear much about it at that time. Later, in the early twenties, there was much publicity given the so-called Water War. Apparently, the Los Angeles people did not give the ranchers very good deals on their water rights. And many of them resented this. Perhaps some of them did not want the deal with Los Angeles. In any event, for a period of quite a few months (maybe it went over two or three years), there were dynamiting parties gotten up by the Owens Valley ranchers, and they destroyed much of the canal work put in by Los Angeles. In later years, this thing was settled, apparently to the satisfaction, for the most part, of the ranchers, as well as the Los Angeles people. However, not all of the water rights were taken over by Los Angeles. A portion of the Bishop Creek area was left around Bishop. But all the remaining areas dried up and were a sad sight to see in later years, after having been so fruitful and so productive during the late teens.

COLORADO

Upon arriving back in Colorado (I believe it was early June of 1920), I soon got back into the old routine of a ranch hand and part-time cowboy. There was cattle riding to do. I think there was some vaccinating with which I helped. Another job which I did during the summer when time permitted was to haul gravel. While I had been away in California,

my Dad Little had been elected to county commissioner. And the district over which he had direct jurisdiction was the Quartz Creek area from Pitkin to Parlin, and the Doyleville area to the end of the county line near Sargents, and part of the Cochetopa area.

He was at liberty, of course, to have road repairs made in his district. All roads were dirt roads in those days. There were no pavements anywhere. There were some bad mud holes [which] developed every winter, and usually they were repaired in the summer by hauling decomposed granite. So part of my job was to take old Kate and Dolly, the black mares, and the running gear of a wagon, which was fitted with several planks, one or two two-by-fours, and the others usually two-by-sixes, and then a couple of planks for sideboards. That held the gravel, and the gravel was unloaded by simply lifting one of the smallest planks, a two-by-four, and wiggling [it] until it was loosened and the gravel would spill out, then the others could simply be tipped over. Unloading was easy. Everything was done by hand. The loading was done by hand, also.

My routine on the day, which was an eight-hour day at that particular time, was to drive up to the gravel pit, load it, and haul it for about two and a half miles, unload it in a mud hole and straighten it around, then come back and repeat the operation. I spent fully two-thirds of the time just riding up and down with the team, so it was an easy job, one to which I did not object. I made five dollars a day, and my dad made five dollars a day for the team.

Other jobs, of course, during the summer [were] to irrigate and to ride the range and help with the roundup of calves and branding, and later in the summer, to help put up the hay. My dad and my sister and I,

with one helper, could manage to put up the full two hundred-ton crop. It was not always done before school took up, but with good weather, we could do that. Everything was done with horses. Mowing machines usually mowed the hay early in the morning and quit about noon, and after the second day, the hay which was mowed the first day could be raked up into windrows. It used to be done by the old New York style rake, which was an end-dump affair, and later on, we got a side-delivery rake in which the windrows were made continuously out to the right-hand side of the machine. The end-dump rake, of course, simply had to be dumped every time it came to the windrow, and it was dumped immediately under the driver.

These windrows, if the ground were a little damp, had to be turned over once so that the hay on the bottom would dry enough to be stacked. The hay was placed in stacks in those days, rather than being baled out of the windrow. There was no such thing as a traveling baler like they have now, run by gasoline. Everything was done by horse-drawn instruments, and the baling was done in a stationary baler, but the work of the plunger, which compressed the hay, was done by a team of horses traveling in a circle, the plunger making a couple of compressions at each revolution. So there was never any hay baled in the green state, like it is in modern times.

At the proper time, the hay would be stacked by going down astride the windrow with what was called bull rakes, or go-devils. Go-devils had wooden teeth, and the hay in the windrow would be bunched up until the go-devil was fully loaded; then you would travel with it to this stacker, which also had teeth, put the bunched material on the stacker, and someone would drive the stacker team, which would pull the load up into the air, and

if it were an automatic stacker, it would then move over the stack and could be dumped by a little pin placed in the proper hole at the bottom of the apparatus. This pin also would release the, spring and would dump the hay wherever the man on the stack would want it. This was a common practice throughout the valley, although some of the old stackers were what they called the overshot stackers. They were homemade affairs made out of poles placed on about a sixty-degree angle. There was a pushing apparatus to which a team was hooked with a long log. This apparatus worked on the incline and pushed the hay up the incline and [it] went on over the stack. But the trouble with that was the fact that all the hay was dumped in one place, and the men on the stack had to pull it out there and place it properly in the stack.

Stacking hay is an art. My dad, Ralph Little, had it really perfected. He knew the exact, proper time when the hay was ready. If you put it up too soon, it will mildew and mold and spoil. If you wait too long, it loses some of its nice green color. Since he sold baled hay as one of his principal money crops, he took pride in producing green hay and nonmildewed hay, particularly for horse feed. He always received a very good price for his hay. I believe it was twenty to twenty-two or -three dollars a ton, even in those days.

Each stack of hay contained usually from twelve to possibly eighteen or twenty tons—that is, the small stacks. However, the larger stacks sometimes could hold as much as twenty-five or thirty tons. It would depend upon the rancher's idea of stacking. In stacking the hay, usually one man could do a pretty good job if he had the automatic stacker. And in doing this, moist hay, which always occurs, especially when you're haying in the lowlands where there's moist ground, must be placed to the outside edge so that it

would dry out. Never leave wet or moist hay in the middle of the stack because it would start the whole thing to burn. There have been times where stacking had been done improperly, and so much heat is generated by the fermentation and the burning of wet hay that the stack would catch fire, and it was destroyed.

Usually a stack yard was placed on high, dry ground. Sometimes as many as two or three or four hay stacks were placed there. Stacks, when first built, were usually probably fifteen to twenty feet high. And, of course, they would settle down to a height of probably twelve feet. They were rounded at the top and sometimes at the ends. In order to keep the wind from blowing the hay around, hangers were put on. Hangers were made by using logs, two logs, tied usually with baling wire, one hanging down opposite each other on either side of the stack. As many as six to ten or twelve hangers were usually placed on the stacks in the Gunnison country.

Sometimes, the kind of grain which was grown there (which was limited to barley) was stacked in a similar manner, or possibly in a round stack, but it, too, had to have the hangers, on account of the high winds in the winter.

This first summer after high school was spent almost the entire time, at work. I believe there was one stack of hay which had not yet been baled, and I helped with that. The baling process could be done by one team and three men. One man was on the stack, pitching the hay down to a platform, where the man called the "feeder" would work. The feeder had a small fork with short tines (with] which he forced a rather limited amount of hay into the baler when the plunger left the box entirely open. He had to be quick to withdraw that fork

so that it would not catch when the plunger was compressing the hay. Then, the other man, the third man, was the tie-er. That was probably the more difficult job. The tie-er had to bring the headblocks up to the feeder. The headblock had dimensions of such character that it would just barely fit inside the baler channel. On each side of the headblock was some two or three channels through which wires could be poked. The tie-er had to poke wires through, say on the left side of the headblock, and when the second block had come back so that the length of the bale was about right, he would have to get on the other side of baler, poke them back, and then tie them. In the meantime, he had to handle other headblocks, bring them up where the feeder could get hold of them.

The call that the tie-er used when it was time to put in the headblock was, "Mud!" I don't know where the term came from. But when he called, "Mud!" the feeder knew that before placing another feed, it was time to put the headblock in.

These bales, in my days, were weighed, each one individually, on a scale; this all done by the tie-er. A little smooth, wooden stake was placed under the wire on the end of each one, and the weight, to the nearest five pounds, was placed on the end of the bale. The bales usually weighed from eighty to as much as a hundred and fifteen pounds. Sometimes, if the tie-er would forget to call, "Mud!" at the proper time, the bale was so long that it had to be wasted because the wires were not long enough to go clear around it. Baling wire was purchased by the bundle. And I can't remember now, but I believe one bundle of wire, using two wires to a bale, would probably bale as many as a hundred bales. The bales were stacked by the tie-er also, four or sometimes five high, depending upon his strength.

I had an opportunity to get reacquainted with my family, so to speak. I found dad, Ralph Little, as hardy and husky as ever. I found my mother suffering from arthritis (we simply called it rheumatism in those days). But her hands were beginning to become deformed, and she had a difficult time playing the piano. She was at one time a fairly good piano player. My sister Helen had started to high school while I was in California, but was unable to finish. She contracted, I believe it was, diphtheria and was ill for quite a long time and was taken out of school and never returned. I believe she had no more than one or one and a half years of high school. She enjoyed working about the ranch, helping with haying and milking the cows and feeding the chickens, and doing all kinds of chores besides churning, washing, and other household chores. She was a great help to my mother and to my dad. I think she should have gone on to school, but in those days, people were not too particular about educating their daughters. At least, that was the case in along the Quartz Creek area where I lived.

WESTERN STATE COLLEGE

My thoughts in leaving high school [were], “How am I going to get an education?” I was interested in science in particular, but I knew my folks could not afford to send me to a university or an expensive college. The same thought occurred to my mother. I believe she was the one who first investigated the cost and the courses of study in the little college at Gunnison, called, at that time, Colorado State Normal School. It later became Western State College of Colorado. She found that I could stay in a place called the “Boys’ Club” free of charge, and she found out that meals were not too expensive, and, of course, I would be provided with sufficient clothing. So it was arranged, therefore, that I go to school at the Colorado State Normal School.

I was somewhat disappointed because it really was a teachers’ school. However, they did have enough liberal arts work so that I could get what science and mathematics I wanted for some kind of technical career. I thought possibly, [at] some later date, I could go to another school and graduate as a chemist or an engineer.

This school, known as the Colorado State Normal School, has quite a little history, but I am not in a position to tell all of it. The normal school was definitely established with a fifty thousand-dollar appropriation way back in 1910 or 1911, and by September 12, 1911, the school was opened as the Colorado State Normal School. And it was supported entirely by taxes, and the students attending had no tuition whatever to pay. The normal school developed a wonderful name for producing excellent teachers. The ordinary normal course was one of two years, but it gained such a reputation that it was finally made into a four-year college, specializing in educational subjects, but having enough other subjects to qualify also as a regular liberal arts school. The school became a member of the North Central Association of Colleges and was admitted to Class A standing in the American Association of Teacher Colleges in 1921.

Early in the history of the school, the student body was composed of not more than a hundred or two. In reading my 1923 yearbook [the Cosecant] the statement is

made that in 1921 and '22, the attendance was approximately nine hundred. I question this just a little bit. By that, they mean the attendance year-round. The school was noted for its summer school, and I believe during the summer, as many as five or perhaps six hundred students attended. But the fall, winter, and spring quarters had much less. I believe there were about two hundred students in school the regular school term.

I believe it was September, early in September, of 1920 that I registered as a freshman. I managed to get a room at what was called the Boys' Club. I must say a word about the Boys' Club, [The rental rat] the Boys' Club was paid by Dr. Samuel Quigley, president of the college, and he had furnished the beds and the bedding. And it was a chance for boys who could not afford to pay board and room entirely to get a college education. This man, with his salary as small as it was, paid that out of his own pocket, and there were as many as ten or twelve of us who stayed at this Boys' Club.

We obtained board, at that particular time, at what was called McKinney's restaurant. This was run by Mrs. McKinney, who formerly had a restaurant in Ohio City, Colorado. I think I made the statement about Mrs. McKinney being a great fisherwoman previously. She had two daughters, and they helped her in the restaurant, but they also attended college. I recall the times we had at the McKinney boardinghouse. It seems there was always a plate of cake on the table at the time we sat down. Usually, that was devoured immediately before any of the other vittles arrived. So much for my board and room.

I signed up for the following studies my freshman year: English composition, which was required by everybody, regardless of what English you've had in high school;

and engineering drawing, which was called mechanical drawing (actually, it was an engineering drawing text). I had had four years of mathematics in high school, so I signed up for analytic geometry, which probably was a mistake. I should have reviewed algebra before doing that. I also signed up for invertebrate and vertebrate zoology, and for General Chemistry I and II. I made forty-nine quarter hours in my freshman year. That year, I was required to take physical education, and I did so by playing at basketball and football. I was not a good athlete, but I did get physical ed. credit for playing on the scrub teams. Usually the scrub teams took the drubbing from the big guys. That was my forte [laughing].

I should say something at this time about the type of people who were heads of departments and teachers. Everyone in the college—that is, everyone of the faculty, seemed to be dedicated, a dedicated man or woman. First of all, our president, Dr. Quigley, was a wonderfully dedicated man, a very brilliant man, and a scholar. He had the faculty of teaching so that you would long remember what he taught. He also enjoyed teaching, and I believe he must have felt that he would have better contact with the entire student body if he could teach one class of the underclassmen and one of the upperclassmen. That, he usually did. During the latter part of my freshman year, I took Composition II, I believe it was, under Dr. Quigley. I never learned so much English and retained so much of it in such a short time.

A little bit about Dr. Quigley, he had his A.B. from the University of Iowa and his master's from the University of Chicago, and he also had a doctorate of literature degree from the University of Denver. He was also a member of Phi Delta Kappa. He had quite

a lot of experience in Iowa, Minnesota, and Oklahoma before he came to Gunnison. He also, in World War I, enlisted in the YMCA. I believe there was some physical defect he had which did not permit him to get into the regular services. So he worked in France as a member of the YMCA. When he returned in 1919, he was elected as president of the Colorado State Normal. He took a great interest in the young people, particularly the boys, and, as I have stated before, took money out of his own pocket to see that boys who were deserving of a college education but that could not finance it would have the opportunity to do so. A statement in one of the annuals reads thus:

Through a kindly and real interest in young people, he has become the adviser and confidant of many a discouraged student; and surely, no president of an institution such as ours is more loved and respected than our own Dr. Quigley.

I think Dr. Quigley's attitudes and life permeated the entire school. The sense of moral values was paramount. There was no such thing as smoking or drinking allowed upon the campus. He fostered all the better things of life. He made things available to many of the students which they had not had before. The school was noted for its music and plays and forensics, but not too noted for athletics. He was a single man at the time I joined the college, and he did not marry until a couple of years later. He had come down with a severe illness, and a lady who was the head nurse for the school took such wonderful care of him that I presume he fell in love with her and married her. I believe her name was Mrs. Dunn. He married Mrs. Dunn in January of 1923.

Another thing which happened about this time, or perhaps it was during my sophomore year, Dr. Quigley tried to make available the courses at the institution for people who were married and had families, yet could not afford to go. So with townspeople and others helping, there were a few little cabins, or small houses, called collectively Highland Village. Married couples, or sometimes, a couple of bachelor students could live in those houses. I believe the rental was extremely nominal, very, very little rental, just enough to pay for utilities. The houses were painted and some of the finishing done with student help, who were paid thirty-five cents an hour for doing this. I worked at some of the painting myself. The money came from donations by merchants, and part of it, no doubt, from donations made by Mr. Quigley himself.

The dean of the school was John C. Johnson, whose specialty was biology. He had attended the Colorado State Teachers' College at Greeley, and he received his master's and doctor's degree at the University of California at Berkeley. He was quite proud of his doctor's thesis, and I think everyone who took biology from Dr. Johnson had the opportunity, at least, to read his study of a parasite—going to the phylum Platyhelminthes, a parasite inhabiting (in one cycle of its life) the ducks which were on the ponds and lakes around the University of California campus [laughing].

My thought regarding Dr. Johnson was that he favored the students [who] were biology majors. I know that, to me, I thought I knew everything there was to know about zoology after taking the course, but managed to make only a C. Yet a pal of mine who was a major—I don't think he had any more knowledge of it than I did, but he received a B. Maybe that was just a college boy's thinking.

The dean of women was an unmarried lady by the name of Lucy Spicer. She also did some teaching. Math was her specialty. I had analytics and calculus under Miss Spicer.

Some of the other teachers with whom I had contact in my freshman year were Miss [Lucy] Green, who taught me English, and Oscar S. Causey, who taught general chemistry. He was also principal of the Gunnison County High School.

I got acquainted also with F. George Damson, head of the music department. I had not taken any lessons in music before this time, but during my freshman year (I believe it was after the first of the year), I began to take lessons on the cornet. This cornet was purchased from my uncle, Date Kramer, who ran a jewelry store in Salida, Colorado, and who also was solo cornetist in the Salida municipal band. I called him Uncle Date. He married Agnes, Ralph Little's sister. But to Helen and me, that pair was always Aunt Agnes and Uncle Date. We made many trips to Salida and visited their home many times. I believe I paid Uncle Date seventy-five dollars for this secondhand cornet. When I took lessons from Damson, he immediately placed me in the band, not as a performer, but simply to get timing, and so forth; and he gave me an alto horn to play, commonly called the "peck horn," to teach me time and rhythm and how to follow band music. I was not in the band proper until a year later.

Mr. [Arthur C.] Krause was director of physical education, and also had the football and basketball teams. I am very certain that he didn't think much of my performance either in football or in basketball. I did make C's in basketball, but as I recall, I made only a D in football. Those guys facing me, since I was a scrub, were really too tough for me. I did manage to borrow a tennis racquet once in a while, and I did enjoy playing tennis when

I had the time. I did have some such time during my first year in college. After that, when I was working every spare moment for board and room, I had no more time. I really wasn't too bad in tennis. I went out for track for just a short time, but soon gave it up because my proficiency in that field was also way down the scale.

As I recall, the Boys' Club was disbanded during the middle of the year, probably because it was too much of a financial burden for Dr. Quigley, or perhaps some other use was made or arranged for the quarters, so that during the last half of the year, a number of the boys were transferred to cots and beds placed in the unfinished third story of what was to be later known as South Hall. So we slept up there in the attic, so to speak, and did some of our studying there.

I was not much of a social climber at any time in my life, but I did join a few things in my freshman year. All the men in the school belonged to a literary society called the Scholia. There was only one such society for the boys because the girls outnumbered the boys, probably as much or more than two to one. There were two literary societies for the girls, one called the Athenians and the other the Milisonians. There were no sororities or fraternities allowed on the campus at that time. I did take a part in one operetta, the name of which I can't quite remember. I believe I was about the last man in the back row, and I sang—or tried to sing, second tenor.

I had to have spending money, and it was rather interesting, the way I obtained it. This first year in school, I did not work for any part of my board and room. However, my dad had sold beef to a Gunnison butcher by the name of Mr. Stone. Mr. Stone went broke. I believe this was about depression time (around the early 1920s), and could not make the payments. However, he could spare five,

ten, or fifteen dollars every once in a while. So I would go to Mr. Stone when I needed the money, and in that way, I helped retire his debt to my dad.

Dates for me, at least, were few and far between at that time, although there was an over-plentiful supply of girls. When you did have a date, it was usually to go to the little picture show, or occasionally to a school dance.

I developed some good friends, pals of mine, one, Cecil Carroll, with whom I went all through school (except during his sophomore year, he went over to Boulder, Colorado); and another young fellow from Crested Butte, Colorado, called Pete Ruggera (I believe he was of Austrian descent); and another young fellow at Italian descent called Tony Danni.

When school was out, of course, I went back to the ranch above Parlin, on Quartz Creek, and entered the routine of ranch life again. This year, I believe I did more hauling of dirt than I had done the previous summer. In fact, I sort of stayed with that job for five weeks or more and made quite a little stake, which stood me in good stead the coming school year.

I can't remember anything eliciting during the summer except possibly a Fourth of July picnic up what is called Alder Creek, where all the neighborhood folks gathered. Everyone seemed to bring the same kind of food. I remember heaps and heaps of potato salad. The meat was fish, which were caught by the young boys of the crowd and cleaned and served right there at the picnic. Everyone seemed to bring plenty of cake, and pickles, also. But potato salad seemed to be the main dish. I guess it's because potatoes, at least the early ones, were easily grown in that country, and other vegetables were hard to come by.

Come fall, I was ready and anxious to get back to school. At the beginning of my

sophomore year, I began to think that I might be able sometime to go to another school because I really wanted to take my subjects in a technical school of some kind. However, we were told that the normal school, which was a teachers' school, was soon to become a bona fide college (which it was), and it was called Western State College. That made me feel a little better, so I figured, well, perhaps I can get what I can here, and we'll see what the outcome'll be.

My course of study, sophomore year, was a rather rugged one. I took calculus, physics, and college algebra (which I should have taken in my freshman year), and qualitative and quantitative analysis in chemistry, and I also continued with my cornet. I worked for my board and room, so I had no time for physical education, and apparently, it was not required anyway.

My work for the board and room situation during my sophomore year consisted of several types. Part of it was simply janitor work. I believe most of my work was done in what was called Central Hall. A little later in the year, I fired the boiler and helped take care of what was called North Hall— that is, one of the floors on North Hall.

I believe it was the same year that I started doing some work in the girls' dormitory, which was also a cafeteria. I think my job there consisted mainly of helping one of the boys in firing the boiler during the school hours. [At] certain hours of the day, I would go down and fire this boiler.

My room, during my sophomore year, was located in the basement of North Hall. It was a room which was originally janitors' quarters. But boys doing janitor work were allowed to stay there. I believe it was understood that the room part came along with the janitor work, and we were allowed, I believe, five dollars a week for the work we

did. Those five dollars a week would buy a meal ticket at the college cafeteria, which was located in a section of the girls' dormitory. By being careful, in those days, you could probably just about get by on five dollars a week—at least the girls could, but the boys had a little rougher time. This year, as I said before, was a tough year. I had some tough subjects, and I had to spend much of my time making enough money to try to get by.

Extra money I had from my summer's work, and I used some of that for entertainment. And there were usually dances every Friday night, school dances. You would take your date to a dance. We had programs. We didn't dance solos like they do nowadays. We danced with the girls. The dances were the waltz and fox-trot, principally. We didn't do any square dances. We also followed a certain routine in dances. You always danced the first and last dance with your partner, and probably always the first waltz. Then you took your programs and traded dances with your friends. I think this was a very fine thing to do. And we all enjoyed it. The music for these dances was furnished by dance orchestras made up of some of the best musicians in the college.

There were a few times we were able to take girls out of town to dances, but this always had to be done on a weekend. It was difficult to take a girl from one of the dormitories under college supervision, so we usually could take a town girl when we went to a dance, say, at Juanita Hot Springs, which was probably about forty miles away, or to Pitkin, Colorado, which was about thirty miles away. My dad had a Buick-4, and I could borrow that every once in a while, if I had a date of this kind.

A word might be said about the kind of clothing we wore. Most of the boys on regular school days wore either corduroys or some kind of a slack, usually low in cost, [and] shirts

with sweaters. In cold weather, we had to be wrapped up pretty warm. We had to wear heavy underwear when we were outdoors, which was a disadvantage, of course, when you were indoors; and we had heavy coats, such as mackinaws, for outdoor wear. For dress-up outdoor wear, we had at least one suit. I believe one suit at a time is all I ever had when I was going to college.

Some of us had irons. We would do our own cleaning and pressing, and sometimes, we would do our own washing. I remember the system we used in doing our washing was to get under the shower. We used big scrubbin' brushes and plenty of old yellow soap. I've forgotten the name of the soap. But we would soap up the clothing and put it down on the floor and scrub it with a scrubbing brush. We didn't run it through several waters; simply rinsed it out good, and hung it up so it would dry; and if it needed ironing, we would iron it. I think many of the girls also did their own laundry.

Girls' dresses, for school purposes, I think were moderately priced dresses. They had to be because the entire student body was made up of people who came from the less prosperous homes. Their dress-up dresses were a little fancy. The length of the dresses usually, I would say, were about three or four inches below the knee. Girls, as well as boys, had to dress warm, especially for on their way back and forth from school. Many of them wore scarves, as well as pull-down headgear, to keep their ears warm. This, of course, was in the wintertime. In warmer weather, they wore different clothes.

We did not get too much warm weather in that country because of its altitude. The altitude of Gunnison, I believe, was something like 7,700 feet. And as stated before, our Gunnison climate was said to be two-seasonal—July and August and winter.

I had taken cornet lessons all this year, and early in the year, I was placed in the band, I believe on third alto horn, or peck horn. F. George Damson was the music instructor and band, glee club, and orchestra [leader]. He was a very exacting person. I enjoyed taking cornet lessons from him. He got me into band very early, first on the peck horn and then finally into third cornet, then second cornet, and finally first cornet in the band, and I probably was almost good enough to play in the philharmonic orchestra by the time I was a junior. However, I did not get into that until I was a senior in 1923. I never was good enough to play solo cornet in view of the fact that there were some experts in that category anyway. However, the band music I enjoyed very much. We played for a number of functions, and we also played in the summer. F. George Damson, the director, stayed all summer. I believe he taught music in summer school. He also kept the band going all summer, and the Gunnison townspeople paid a certain amount for weekly concerts. He took us on several trips with the philharmonic orchestra. But one trip was in what we called the lower country. I believe we played in Aletha, Delta, Montrose, and several areas. We also played, those of us who stayed during the summer, in the summer band concerts in Gunnison. We got paid for those. 212 know that we who played in the band didn't get much out of it. We got fifty cents for a practice and one dollar for playing the concert. I drove the Buick-4 about thirty-six miles for every concert and then a practice. So I know it was not a money-making proposition; however, my folks did not object, and when there was a concert, they would often go to Gunnison with me.

Sometimes, with the mosquitoes as thick as they were in the Gunnison country, those mosquito bites interfered considerably with

our playing. But P. George Damson was quite a character, very exacting, as I say, but we enjoyed him. We also called him "the Scotchman" because he was noted for being a little bit tight as far as money matters were concerned.

I forgot to state that during the spring, I believe the month of May, of 1922, the college band went to Denver for a Music Week festival. The band was not composed wholly of college students. Some of the best Gunnison High School students also made up a part of the band. We stopped at Salida, having traveled there on the narrow-gauge railroad, and played a concert for the Salida people on the way to Denver. The Salida people seemed to enjoy it very much. We went on to Denver, and I believe we stayed there three or four days. We got the Denver Post prize as the best of the school bands and some others at the music festival. We won over the University of Colorado, the agricultural school, and several other bands.

I believe it was this year that we also went to Telluride, Colorado for a Fourth of July celebration. We played there for a two-day celebration. Telluride, in those days, was quite a wild town. Some of the boys went slightly overboard. I recall one very interesting thing that happened in Telluride during that celebration. We were taken by one of the bankers through the bank vault, where the gold bars were stored, which had come from the rich gold mines. There must have been as many as a hundred of those bars. I've forgotten the value. I think each one weighed somewhere in the neighborhood of forty pounds. This was quite a sight.

In the fall of 1922, I was ready to begin my junior year— now at Western State College. The Colorado State Normal School had its name changed and had become a full four-year college, specializing in teacher training,

but also giving liberal arts courses. I started out this year taking a few courses which were a little bit foreign to what I really wanted. Nevertheless, I'm glad I took them because the teachers were excellent teachers, and I think my outlook on life was broadened considerably by having taken such things as American literature from a Miss [Frances] MacQuat, American government and world politics from Mr. [James S.] Ferris, an excellent teacher, and economics, also, from Mr. Ferris, and psychology from Dr. Herschel T. Manuel. This year, I began to think that perhaps I should take enough educational subjects to qualify to teach. Thus, psychology and principles of education (a course which I also took), would be necessary. Another course which I took was college geology. I enjoyed this course very much. Ada Kansgen was the teacher, and although she was a woman, she had a profound knowledge of general geology. I recall one very interesting field trip we took into the limestone area, about twelve miles above our ranch house, where we studied fossils and collected some specimens. Some of these I still have in my possession.

Aside from my regular subjects, I continued with work in the band and with the literary society, the Scholia. I also became president of the chemistry club. I still roomed in the basement of the college, this time with Cecil Carroll. We did our studying there, and we were not interfered with in any way) as a matter of fact, we were very comfortable.

In addition to my studies, I again accepted some work jobs, some of them quite tedious and difficult, as a matter of fact. One of the jobs was firing the boiler at the cafeteria and acting as night watchman. This job lasted for about the first half of the year, or perhaps a little longer. Some interesting things happened there. That boiler had to be kept going in the cold winter nights, and if it were

not, we would get plenty of complaints. The cafeteria was just above the boiler room, and all of the rest of the building was composed of two floors of rooms filled with girls—the girls' dormitory. Now, the night watchman proposition was rather a delicate subject to mention, but that was my job after eleven o'clock, to patrol all the halls once an hour to see that there was no fire. At the time, because of the nature of the firing job, using coal, firing the boilers, I wore a pair of coveralls over my clothes. They were usually quite black, to say the least.

One little experience which made quite a humorous event: one time, I presume about one or two o'clock in the morning, as I was patrolling the halls and just made the corner. At the same time, a girl they called "Pete" Peterson was making the corner from the other direction, just having visited, probably, one of the ladies' rooms. We collided head on. She let out a tremendous shriek and ran for her room. I know that she was blackened plenty because I had this black, coal-dusty, sooty set of coveralls on. And there was quite a commotion. I got out of there about as fast as I could, but the commotion seemed to last for quite a while, and Peterson was kidded by the other girls for some time for having the print of a man on her pajamas.

After the middle of the year (I can't remember just about what time), I also worked in the chemical laboratory preparing reagents, and so forth. I did this in place of doing the janitor work, and from that time until I graduated, I did no more janitor work.

During this year, I had a very difficult time with one of my subjects. The subject was analytic geometry, tough in any event, but it was particularly tough for me because I had very little sleep at that time on account of my night job at the cafeteria. I would usually go

to bed at about six o'clock in the morning and try to sleep until about ten-thirty or eleven. I had arranged my courses so that most of them occurred in the afternoon. This toughest course came right after lunch. After lunch, I usually would sleep in. I think I slept through most of that class, and so my grade was D, instead of a C or a B, which I should have had.

This year also meant that I had some kind of an awakening as to the weaker sex. I became quite enamored of a little brunette by the name of La Rue Taylor. This happened in the fall of the year, but for some reason or other, she had cooled to the point where she would hardly speak to me when she came back after Christmas vacation. I never could figure that out, but it's probably just as well. A little after Christmas vacation, I noted one day in the cafeteria a blonde girl come through the line. Why I said this, I don't know, but I said to Cecil Carroll, who was beside me, "That's the one." And sure enough, I got acquainted with Ruth Fairley, and before the school year was over, we were engaged. We attended most of the school functions together, and Cecil Carroll, my best friend at the time, would get together with Ruth, and I think they did a lot of discussing, the subject being Lawrence Little.

I recall some things about Ruth. She was usually always well dressed, not expensively dressed, but well dressed. Her mother was an excellent seamstress, and I believe she made most of Ruth's clothes. However, she had one hat which caused me some discomfort. This hat had two feathers, one sticking out each way, and they usually caught me about the height of my chin.

There was a campus paper called *Top of the World*. The name was quite appropriate because I believe the elevation of Gunnison, Colorado was higher than the elevation of any other campus town in the country. This

same year, since we had become Western State College, meant that we were going to change the letter N, which stood back of the college-hill, and put up a letter W on another hill, clear across the Tomichi Valley, one which could be seen for miles up and down the Tomichi Valley and part of the Gunnison Valley. Boys and girls joined in carrying rocks and carrying lime. We built the largest letter W in the world. I don't believe there's a larger college letter to this day. The letter w was probably at least three miles away from the campus, but was plainly in view at all times.

Another little item which was interesting about the Gunnison country, and the town in particular, was the La Vida Hotel. La Vida Hotel was down in what was called the lower part of town, with not many business houses or dwellings near it. Of course, it housed the D & RG narrow-gauge railroad depot, and it actually was the biggest hotel and one of the famous old hotels. This particular hotel gave free board and lodging to its guests every day that the sun did not shine. They very seldom had to come through because regardless of the storms that occurred, usually always, at some time during the day, the clouds would break, and the sun would come through. Presumably, this was because of the high elevation.

I still played in the band, and I believe I was promoted from second to first cornet about this time, and, of course, made the trip to Denver for Music Week. A rather interesting episode occurred upon my return from Denver. We came back on the narrow-gauge, D & RG, after changing cars, of course, in Salida from the broad-gauge. On the trip with the band was Ole Olsen (I forgot his first name), a six-foot-two boy of Swedish descent, who liked to snuff. He taught Cecil Carroll and me to chew the stuff because it seemed

to be a great stimulant, especially right before examination time. You could chew the snuff, and it seemed to clear your mind. This is not a pipe dream. It actually seemed to do that.

In any event, on the way back from Salida to Gunnison on the P & RG, we were all (several of us in the party) chewing snuff. And it is not a neat habit. Some of the snuff extract chewed a little bit sometimes drips down the side of your chin and leaves rather an unsightly mess. As I got off the train, who was there to meet me but Ruth. Her mother and father had come up to visit her, and they were on their way to go back to Grand Junction. So I met Mr. and Mrs. Fairley for the first time with a chew of snuff in my mouth. And I had a horrible time trying to get rid of it without giving it away. But I think it was already given away because I had one of those brown patches on my chin. After they had left, I really got a tongue-lashing from my bride-to-be, Ruth.

Another so-called horrible incident occurred in this snuff chewing. Cecil Carroll and I used to think we could get away with this snuff business even in the library. So one evening we went up to the library to study. We took a little can of water along with us and put it down between us because in removing the excess saliva which had accumulated from chewing the snuff, you had some place to expectorate. Things went along pretty well until the librarian happened to walk over on our way and found what we were doing. She announced to the entire assembled library, "Well, here are two people, addicts of a filthy habit, and I am now expelling them from the library." So we picked up the can and away we went [laughing].

Because of the fact that I had to work in addition to carrying as full a load as possible, I could not quite make enough credits without going to summer school. Therefore, it was

necessary for me to take enough credits to make up approximately forty-eight quarter hours for the year. Therefore, I spent the first five weeks of the summer session preparing myself now for teaching. The subjects I took were educational measurements and the measurements of intelligence. This probably was about the beginning of the educational measurements and measurements of intelligence. The old essay type of examination was becoming passé, and this new type, with true-false, multiple choice, and so forth, was coming into being. And Professor Terman of Stanford University had quite recently modified the Simon-Binet intelligence tests of France, so we were drilled pretty thoroughly in the measurements of intelligence under the Terman modification. I also took more cornet lessons and made an additional hour in the five weeks.

During the balance of the summer, I was back at home. However, I believe this was the summer, also, that Cecil Carroll and I decided to make some money during "Cattlemen's Days." "Cattlemen's Days" was an annual rodeo proposition which was held usually in the middle or latter part of July. Therefore, we decided to build and operate a hamburger stand, which we did. We bought the lumber, put up the stand, got the permission from the city to do so, and managed to get cooking utensils and dishes from our homes. (I mention Cecil's home. Actually, when he was home, he was living with his sister, Mrs. Louis (Maida) Rouviere, on a ranch a few miles out of Gunnison.) These things were collected, and we started making hamburgers for "Cattlemen's Days." I believe this period lasted about three days. We did very, very well. But finally, the meat markets ran out of ground hamburger, and the last half of the last day, we had to have sirloin steaks ground into hamburger, and, of course, sold them for the

same price. Actually, we didn't make much money on that, but how those people enjoyed those hamburgers, including Carroll and Little. I believe we made about a hundred and twenty or thirty dollars apiece in this episode, after we had sold the lumber and other supplies.

The balance of the sunnier, as I may have stated before, was spent at home on the Quartz Creek ranch doing some fishing, but milking the cows, doing other chores, and helping with the haying until the fall tent started for my senior year.

As I have stated before, it was necessary for me to attend at least the first five or six weeks of summer session in order to get enough credits to make a major in education. I could guarantee a major in chemistry, but I needed enough quarter hours to graduate, and also enough quarter hours in educational subjects to qualify for a high school teacher. One of the jobs I had in order to do this was the dishwashing job at the cafeteria. I say the dishwashing job because I was really the boss of the operation. I was supposed to be there during the meals and perhaps as long as it took after each meal. And I had charge of a dishwashing machine. I had four girls, who were busgirls, who'd bring the dishes in, and one of them sometimes would scrape the dishes and stack them. My job was to put those plates, cups, saucers, silverware, and the whole works into the dishwashing machine, put the soapy water on, and then the rinse water. And there were twelve girls working under me, actually drying those dishes with tea towels, something which is not done this day. I got thirty dollars a month plus my board and room for doing this. But because of the long hours I put in, I had only time enough to carry about, I believe, six quarter hours of college work.

Another job I had, which I believe was the following year during the first five or six weeks

of the summer school session, was working as baker's helper. This particular job was rather inconvenient because you had to be on duty at three A.M. in the morning, but you were usually all finished by six-thirty or seven. This also paid thirty dollars a month and board and room. I would arrive at three o'clock in the morning and start the fires up in the bakery ovens and would clean things up that needed cleaning. Then the baker would appear, and he would give me instructions about mixing ingredients for certain things such as breads and the doughnuts, cakes, and perhaps pies. I remember rolling out crusts for as many as forty pies, and I would also put the fillings in sometimes, and the covers, and assist with the baking. I got fired from this job, along with two other couples—the girl I had and two others. We'd spent too much time up at Juanita Hot Springs at a dance. And the best we could do was to get me back to the bakery at about a quarter after three. And the baker just about exploded because I was late, and the head chef fired me from this job. Those things didn't matter so much in those days, however, because we could always find something else. I didn't suffer any for it.

I believe that young fellows in their late teens and early twenties make friendships which are lasting friendships with fellows in their own age group—that is, just a few fellows, not a lot of them. Two of my best friends in college were Cecil Carroll and Erwin Gray. Cecil I knew first; I didn't know Erwin until the beginning of my sophomore year.

I'm going to talk now about Erwin. I can't remember just how I became acquainted with him; but he had been to the University of Colorado, [where] he spent part of his freshman year. I believe he did not finish his freshman year. He then returned to his home in Gunnison; his father was a real estate agent

but was not doing too well at that time. And Erwin came to this “poor man’s college” and got some of his math courses and science courses.

I remember Erwin had a little stripped-down Ford he called a “bug.” It had an engine, four-cylinder engine, a windshield, two seats, no top, but there was a little frame in the back which was probably large enough to carry a suitcase or a few things like that. And I had many trips around the Gunnison country with Erwin, perhaps on fishing or hunting trips, more than for any other reason. There was not room in this bug for us to take our girls anywhere. However, on rare occasions, I could get my dad’s Buick-4, and if we were going out away from Gunnison to a dance (Permission had first been obtained, of course, from the dean of women), then we had the Buick. But Erwin’s bug was a two-seater, and there was only room for two people to ride.

Erwin and I had quite an attachment for each other. We told each other all our troubles, trials, and tribulations. And he began to be very much involved with a girl, and I think she finally sort of turned him down, as I can remember. And a little later on, I had the same kind of troubles.

One thing I must mention, this is interesting in the present day and age on account of the ecology of the country, and that is a hunting trip that Erwin and I took together. I believe it was in the late summer, probably around August, of 1923. We were going bear hunting. That sounded big. Actually there were not many bears left in the country, but bear hunting we would go. Erwin drove his bug up to the ranch, sixteen miles from Gunnison, and left it, and I secured two saddle ponies with the saddles and paraphernalia. He brought a .30-.30 caliber rifle, and I had a Marlin .32-.40. And,

of course, we had leather scabbards on the saddle, so it was easy to carry the guns.

We left early one morning after spending the night at the ranch, and we rode across the meadows of Quartz Creek, up what we called Long Gulch, and over a little summit into the Alder Creek area. And we followed up this Alder Creek area, first through quaking aspen groves and meadowlands— that is, natural meadowlands, rangelands, on up through the timberland, and finally, up past an old mining camp called the Carbonate King, so-called because it probably was lead-silver ores, most of which, of that type, were on lime contacts. We then went up further without seeing any bear. I believe we did run across a deer or two, but it was against the law to shoot them at that time of the year. But we went clear on up to the timberline on what was called Mt. Baldy. And we rode on above timberline, and I must say now that the view offered at that point was almost undescrivable, not only the view out across country, but here was this Colorado blue sky, and the sun shining down on myriads of Colorado columbines, the blue columbine. There were so many they couldn’t be counted. Mt. Baldy had rather a smooth top, rather than the rugged, rocky tops, characteristic of so many of the Rocky Mountains. And this smooth top, rather, was covered with enough alluvial material so that the columbines and the bunch grass and the yellow daisies could get a start. This was like a sort of fairyland, and at the present time, I don’t know what has happened to that particular area. But I do know that a few years afterwards, the sheepmen found those timberline bonanzas. Cattlemen objected to having the sheepmen on the cattle range. Cattle ranged at lower elevations. They were seldom above timberline. In the later years, sheepmen shipped sheep in from eastern Utah

and the lower end of western Colorado by rail, and later on, by truck. They would bring them up about the middle of June and unload them in the high country, as far as the roads would go, then drove them on up to timberline. And I'd heard that in later years, the columbines and all the other beautiful flowers were pretty well disturbed and macerated by these thousands of sheep. I'm not so sure that they ate the columbines, but I presume they did.

Another thing about the beauty of this area in Colorado was the magnificent stands of Engelmann fir. Commonly, they're called Colorado blue spruce, not so much that they are really blue, but a good many of them had a blue tinge to them. The Engelmann spruce or Colorado blue spruce seemed to favor rather wet locations and the north slopes, which stayed moist practically all year. There were also pines that we probably called yellow pine. I'm not just sure what it was. I believe on the West Coast, some of those were called ponderosas, but we did not have the real ponderosa pine. These trees were in groves interspersed with quaking aspen in the wet places. And the quaking aspen trees in these higher mountains often occurred in hundred-acre patches, or more. Wherever there was large, wet area, the quaking aspen would spread. It was a beautiful sight to see these trees after the first few frosts in the fall. The colors were yellow and deep gold with a tinge of red.

Erwin and I enjoyed that view, and I think the trip—so-called bear-hunting trip, was well worth obtaining that one view. Never have I seen another place just like that one on Mt. Baldy.

Another interesting thing happened on this trip. As we got back down into the timber, below timberline, that transition from no timber to timber, occurs—almost instantly, there's not much graduation from no timber

to timber. However, a few scrub trees grow above timberline, but they're usually so badly bent and dwarfed and disfigured that they don't do well. But anyway, after we got down a few hundred feet below timberline, one of the horses kicked over something that was very shiny. We got off our horses and examined it, and not knowing too much about minerals, we assumed it would be a silver ore. There was quite a little of it around there. We marked the place. We had nothing on which we could write to stake out a claim, but we marked the place so we could easily find it again. We picked up samples of the ore and took them down to the Gunnison country, where Erwin's brother, Homer Gray, had told us he thought it was a lead ore, galena. By checking with an assayer, we found that it was lead ore, and it did carry some silver. We did go back later and do our location work and staked the claim, but the area was so far away from roads and railroads and so isolated that it really could not be worked by a couple of green kids.

Erwin and I made it home that particular day by dark. This event, I think, was memorable mainly because of the beauty, which I've tried to describe, on the ground. It's impossible to describe the beautiful vistas from those high Rockies. There're still some of them snowcapped, even in summer, late summer. But the changes from light green quaking asp to the dark green pines and then to the barren rocks and crags in the high areas, and the stream beds with willow bunches and alder trees, and then down below that, the gray of the common sage, *Artemisia tridentata*, then in the lower valleys, which were poorly drained and were alkaline, was the yellow "buck brush," as we called it.

In some areas, particularly along the banks of the canyons and higher gulches, were small groves of chokecherries. These chokecherries are very well named if you try

to eat them, especially if they are not fully ripe. They make a marvelous syrup, rather than a jelly. The syrup can be used on pancakes. We often gathered those chokecherries and brought them home, and our mothers made this sort of a syrup which was used in the wintertime for pancakes. By adding pectin, you could make a gel. We often filled our pockets with the ripe chokecherries. When they're ripe, they're really almost black. Not many wild berries grew in that country on account of the severe climate. However, there were the chokecherries, and there were a few wild currants, some wild gooseberries, and the serviceberries. They were commonly called "sahrviceberries" back there, but I believe it's s-e-r-v-i-c-e. Not very many people use the serviceberries, but I believe some of the old-timers had used them.

To continue with Erwin Gray, I believe he had finished all of his sophomore year and perhaps part of his junior year, counting his University of Colorado and the Western State credits, by the summer of 1923. During the winter of 1922-'23 he went with a girl by the name of Margaret Cornell, whose folks lived down in the lower country, as we called it. I've forgotten just what part, but it was on the western slope. And I knew Margaret very well, and Erwin and I would double-date many times. I was engaged, of course, to Ruth Fairley at the time.

Margaret moved—or, her folks did, rather, early in the summer of 1923, to San Jose, California. Erwin just about immediately picked up his belongings and moved to California, secured a job with the state highway department on a survey party, and his location was near Palo Alto, I believe in the neighborhood of Los Gatos. In the late fall or early winter, I received word from Mr. Gray, Erwin's father, that Erwin had come down with a severe case of inflammation caused by

contacting the poison oak so prevalent around the Los Gatos area. It was only about two days after that I received word that Erwin was dead from this terrific allergy.

His body was shipped back to Colorado, and Mr. Gray came to me and asked if I would see Dr. Quigley, president of the college who thought a lot of Erwin, and see if he would give the funeral service, which Dr. Quigley agreed to do. As I recall, the service was held in the Episcopal church. I never heard a finer eulogy, it might be called, from the lips of anyone, preacher or otherwise. It was quite a blow to me and several other of Erwin's friends to lose him.

In my senior year of college, 1923-24, I emphasized the educational subjects in order that I could secure enough credentials to qualify as a teacher. However, I stayed pretty well also with science. I took organic chemistry this year, college geography. I believe I finished up some analytic geometry which was unfinished. I also took philosophy under Dr. Quigley. I took courses in heredity, and under that marvelous Mr. Ferris I took American history and American diplomacy. I had already had world politics and economics under Mr. Ferris. Educational subjects included high school teaching methods, the teaching at chemistry, and I believe I had some more psychology, but I can't remember what kind it was. I also took a two-hour course in Bible study. I believe the text we used was called *The Social Principles of Jesus*. As I will state later, this came in handy for me when I first arrived on my teaching job in Nevada. I also continued with cornet. This year, I believe I was advanced to first cornet in the band, and I made second cornet in the philharmonic orchestra.

Again, I had to attend summer school in order to complete enough work to graduate.

However, prior to summer school, all persons applying for teaching jobs had to pass a review by the state board of education. This, in some respects, was not done as it might have been done because it would be impossible for a few people to examine so many students. I was not teaching a class [of] high school caliber, which would qualify me. I did, however, have a class in chemical laboratory. This I did for my board and room in lieu of washing dishes, sweeping floors, and so forth. I had charge of a laboratory section in general chemistry. However, I could not use that, so I had to borrow a class from a lady who was teaching general science. I can't remember her name just now. And the state board of education, consisting of several people, strangers to me, plus Mr. Quigley, would come in and sit down and take notes. They stayed in the room possibly about fifteen minutes. I rather dreaded going through this experience, but I guess I must've handled it all right. Of course, you had to have a good lesson plan, and that I did have. But actually, taking a strange class with no experience and trying to teach before the state board of education was a little bit wild. However, I think through Mr. Quigley's influence, I managed to obtain the teaching certificate, which was also a life certificate to teach in secondary schools of Colorado.

At this point, I believe I shall give some brief character sketches of my favorite instructors in college. First, I would like to discuss something about William Manuel, our chemistry teacher. Since chemistry was my major, I spent a lot of time in his classes, of course, and had, I believe, forty-eight quarter hours in the various kinds of chemistry. Bill was a graduate of DePaul College, and he had secured his master's degree at the University of Illinois. He was an excellent teacher. He could lead us into solutions of problems. He had a way about him which was marvelous

in that respect. I enjoyed every class I ever had under W. A. Manuel. One unfortunate thing happened to him while he was teaching, I believe, during my fourth year, or early in 1924. There was no natural gas supply. The gas for the burners and flame all had to come from artificial gas. That was made, of course, by generating acetylene with a regular acetylene gasworks. One day he had gone down to examine the apparatus because it wasn't functioning properly. He let down an electric globe into the tank, and it must have crashed against the wall, and the explosive mixture caught him on, I believe, the right side of the face, put out his right eye, and scarred him very badly. He was out of school for several weeks, but you couldn't keep a good man like Bill Manuel down. He was back teaching us again and doing a fine job of it. However, those scars lasted all his life.

I would like also to say something about James Ferris, the teacher of history and economics and government. I enjoyed his classes very much. He brought out the real facts and accomplishments in history. One course in world politics was particularly interesting to me. It gave us an insight in that class of the way things happened in this world, not always to the best advantage of everyone, of course.

I must also say a word about Miss Arent. I have forgotten her first name, but Miss Arent was a graduate of Columbia University, and I believe she had her A.M. from Columbia. She was an excellent teacher of educational subjects and educational philosophy and sociology. I believe I got as much from Miss Arent as I did anyone else in the department.

I must say a word about Ada [C.] Kansgen. Miss Kansgen taught some math courses. She also taught geology and geography. I got along fine with Miss Kansgen, and I was very good in geography and geology both. At the time

I took geography, it was a four-hour course. About half of the work of this course was making outlines and outlining the studies. I made a deal with Miss Kansgen whereby I would take it for only three hours if I could get out of making up these reports. She agreed. But she also used me upon occasion to do some of the lecture work, and also she would ask me questions, if I thought this and that was right. That did not make a hit with my contemporaries in that class, most of whom were girls, and particularly did not make a hit with Ruth Fairley, to whom I was engaged. But I did enjoy Miss Kansgen very much.

I was engaged to Ruth Fairley beginning, I believe, in May of 1923, and we went together, of course all the school year of 1923-24, and later, in the summer of 1924. I had to take a few more courses in the summer of 1924, and I believe Ruth had to do the same in order to finish her degree. We had some very good times together, and we double-dated with other couples very often, and Ruth made several trips with me to my home, up above Parlin. I will never forget the Thanksgiving experience, 1923.

My mother put the both of us to work on the turkey. We got the turkey picked and all ready for the oven, and then we had to make up the dressing with my mother's instruction, and we stuffed the turkey. I will never forget that stuffing. I think I must have pushed that in with enough strength—. I probably thought I was baling hay because I really filled that turkey! After the turkey was about half done in the oven, there was quite an explosion. I guess the dressing went all over the oven. And Ruth lamented that, but we always look upon it as one of the experiences.

TEACHING CAREER - CARSON HIGH SCHOOL

Late in the spring of 1924—first of all you must remember this was sort of depression time, jobs came hard, chemists were a dime a dozen; it was impossible to get a job as a chemist, but during this time, Cecil Carroll and I wrote letters to all the state departments of education in a line with Colorado on west. We did not care to locate anywhere in the East. I believe we'd written to all eleven western states and probably included Texas. Answers were not very encouraging. We also made contacts during the summer with different superintendents who had come there either to teach in summer school or to take additional courses. I finally managed to secure a job in eastern Colorado. At the moment, the name of the place and the name of the superintendent skip me, but I did have this job. It was teaching math and chemistry at a salary of fourteen hundred dollars.

About the day I accepted this job, I received a telegram from W. J. Hunting, superintendent of schools at Carson City, Nevada—that is, state superintendent of schools, stating that I had been elected to

teach chemistry and physics and math at the Carson City high school for a salary of sixteen hundred dollars. Upon receiving this word from Nevada, I contacted the superintendent from the eastern Colorado school and told him I would very much appreciate it if he could release me because of the offer I had received from Nevada. This he did.

Immediately, my pal, Cecil Carroll, took the job I had left. We thought that each of us had a school, Cecil in Colorado, and I had one in Nevada. Later on, when I came to Nevada, I had had a long distance call from Cecil Carroll, stating that he had given up the same job in [Colorado] that I had, because he had been elected to teach in the Lovelock High School. And he and James Patten, one of our schoolmates, was going to teach in Eureka. And he and Jim were going to come out by train to Carson City.

There was one catch to the job in Nevada. Mr. Hunting, the state superintendent of public instruction, had a sort of state teachers' agency. Anyone securing a job through Mr. Hunting's department was required to pay a

fee very similar to the fees paid commercial agencies, except that it was much less. I've forgotten what the percentage was, but that was one thing that I had to do, was to take care of the fee. Also, I found myself rather short of funds and had to borrow, I believe it was two or three hundred dollars, from my mother, all of which, of course, would have to be paid back later on.

I came to Nevada by train, leaving Colorado, I believe, about the end of the third week in August. But instead of switching from the D & RG to the Southern Pacific in Utah, I made the mistake of staying on with the D & RG Western, which took me up to Portola instead of Reno. Upon reaching Portola, I had to wait for the stub train which went into Reno. I can't remember the exact date, but it must have been possibly around the twenty-third or -fourth of August I arrived in Reno, and was told that I could get to Carson City on the V & T "Inter-urban." I believe it had a name besides the Interurban, but it was a single gasoline-operated streetcar, you might say.

So I took that to Carson City, and the first man I got acquainted with in Nevada was John Amodei. John was raised in Carson City. He and his brothers were Carsonites, and I later got acquainted with Pete Amodei, his brother. Pete played in the Carson City band. Upon arrival, I went to the old Arlington Hotel and spent my first night in Carson City. I contacted Mr. Gus Hofmann, the superintendent of the Carson schools, early the next day, and he helped me find a place where I could get a room; but I did not arrange to get board at that time.

The place where I got room was called the Briggs House. It was on I believe, Nevada Street. I can't remember the address. Mr. [Gilbert] Briggs was an elderly bachelor, and he rented out rooms to several people. He had a room for me. To describe that room briefly,

it was up on the second story on the south side. There was a little potbellied stove and a wood box, and, of course, the usual things like dressers, bed, and suitable closet space. Everyone had to buy his own wood, I was told, in the winter, in order to keep warm.

I soon got acquainted with some of the tenants. One of the tenants name was Hulbert Horn, who had graduated from the University of Nevada in civil engineering and was working for the Highway Department. Another tenant was Huston Mills, also working in the Highway Department. I believe at that time, he was a right-of-way engineer. He later became the chief Highway engineer.

They—Horn and Mills— told me that I should try to get a place to board with Mrs. [Martha Ferris] Schulz, which was just across the street from the Briggs place. Mrs. Schulz, they said, set a fine table, and everyone had a lot of fun at that boardinghouse. I took their advice, saw Mrs. Schulz, and she said that she would take me, but I believe I had to wait two or three days for a room. This was all done my first two or three days in Carson City.

School was to have continued the following Monday. In the meantime, I had been through the school building (which is located on Nevada Street, across from the Leisure Hour Hall), and was shown around through the building by Mr. Hofmann. But there was an epidemic of, I believe, scarlet fever at the orphan's home, so school opening date was delayed. I believe it was delayed at least a week. However, this did give me a chance to go through the rooms and organize my laboratory. My subjects were to be physics, general science, Algebra I, Geometry I, and, of course, several study halls. I believe I also had Algebra II, but I can't remember now about that for sure. I rearranged the lab during that interim before school the way I wanted it and

became acquainted with several of the young people around town.

I also had a chance to walk around Carson and view the town and surroundings. And a brief description of Carson City at that time might run like this: it was served by the V & T Railroad from Reno, which also continued on to Virginia City to the east, and on to the south to Minden. It was the principal mode of heavy transportation. Of course, automobiles were fairly plentiful. Most of them were Model T Fords and smaller cars, like Chevrolets, small Buicks, Stars, and several other cars like that.

And the roads were unpaved except the one between Reno and Carson. Carson Street was paved full width from about six blocks. But just beyond the capitol building, it was paved only in the middle, and the rest of the street was dirt. The Reno-Carson highway was fifteen feet wide, Portland cement concrete. It went on over Lakeview Hill about the same position it does now, then down across Washoe Valley, past Bowers Mansion, as it does now, then over the summit, but followed a little different course than the present road. It was fifteen feet wide until you got to Huffaker's, where it changed to a width of eighteen feet all the way on into Reno.

The roads in other directions were all dirt roads. The road to Virginia City was a dirt road, and all of what was later to become U.S. 50, on to Fallon, was a dirt road. The road to Lake Tahoe was over what was called the old Osterman grade. It left Carson on King Street, went west past several small ranches, one of which was the old Quill ranch, and on up a very steep grade, and around the sidehills through the timber, and on up past the remnants of an old sawmill to Spooners Summit, and then on down, both to the south and to the north, over dirt roads.

Carson City had all dirt streets except the main street. People seemed to have mainly white houses with a white picket fence around them, and everyone had elm trees. Actually, if it were not for the mountains, you might think you were in an old New England village at that time. Very few people brought their children to school in vehicles. I believe most of the children who came to school walked, or they may have been brought to town, in some cases, by parents. But in those days, there were no school buses, that I remember of.

The people in Carson whom I met were very hospitable, and there were several things to do. There were a number of clubs. I was asked to join what was called the Leisure Hour, but I did not do it. I was also introduced early in the picture to August Berning (we called him "Dutch" Berning) and to a man they called Prof Smith, who, at the time, was the leader of the Carson City bands. And one of the first things I got into was the Carson City band. I played the cornet in that band for many years.

The day school started, my schoolroom, which was really the laboratory, also, was filled to running over with all of the people who wanted to take general science. Apparently it had the name of being a snap course. And not only were there freshmen and sophomores in there, but half of the juniors and seniors wanted to take it. This problem was taken to Mr. Hofmann, and he immediately cut out all juniors and seniors from the general science class. And I got that class down to a size of about forty students, I believe. That was the largest class I had. I had an algebra class, Algebra I, of about twenty-five people. Those were mostly freshmen. I had, I believe, a geometry class of about the same size, a physics class of about sixteen, four of them girls. I believe I also had a section of Algebra II with very few students in it.

My superintendent, Mr. Hofmann, and Mrs. Hofmann were very gracious to me. They would take me on rides. I had no car at the time, no mode of transportation except to walk or use commercial transportation. And I believe I took my first trip to Reno by car with the Hofmanns. Other people with whom I got acquainted were also gracious in that respect.

The boardinghouse crowd at the Schulz's were all congenial people. I think there were about as many as seven or eight of us boarding there. Mrs. Schulz was a lady, I would say, in her sixties. She had an Indian woman helping her with the housekeeping. And after a few months staying at the Briggs place, I was able to live at the Schulz place. I changed and roomed there. The cost of room and board in those days, I think, was forty dollars. But all things were rather cheap.

But going on about Carson City, it seemed to me that the people were not all too interested in what happened to Carson City. Many of them living here were people working in the state offices or in state government, and their homes were in other parts of the state. I don't recall that there was a chamber of commerce, although there may have been one. And at that early date, I believe their only service club was the Lions Club. However, there were some sports organizations. There was a tennis club, which I immediately joined, called the Carson City Tennis Club. And this club put on the western Nevada tournaments every year. I've forgotten now if it was in the fall of the year or the spring. It may have been in the spring. But I met a good many interesting people in the tennis club. There were a number of high school students there such as Mary Rochon and Douglas Busey and Ed Ducker, Doris Johnson, Emma Berger, many others who were excellent tennis players, and quite a number of adults in the town,

the Loys—Howard toy and Mrs. Loy. Mr. toy was the assistant state Highway engineer at the time. Mrs. toy was at one time, I believe, Nevada state tennis champion. And Billy Holcomb of the Highway Department was also in that club and a good player. And there was Douglas Vaughn, Joe Riley, and Lorraine Moses, and several others. I can't remember all of the names. But these people were all congenial, so there were things to do around Carson City. I did not get lonesome at any time.

When school did start, one of the rather startling things, from my way of looking at it, happened early in the game. One late afternoon when school was out, I was busy straightening things out in the laboratory, and I had this laboratory apron on. And a lady, brunette, rather striking looking, at an age, I would say, perhaps in her late thirties, came in and looked around the room and went out again. She immediately came back in and says to me, "Have you seen anything of Mr. Little?"

And I perked up and said, "Why, I'm Mr. Little."

This lady says, "Well, ha, ha, ha. I thought you were one of the students."

That sort of put me a way back. She then introduced herself as Anna Louise Sampson. I later found that Anna Louise was a grass widow. I don't know what happened to her husband. But she was very much interested in what happened to the kids in school. She took a very strong interest in the musical performances and in plays and things of that kind, and she was anxious to help with the students. However, in talking to me, she, probably very graciously, offered to take me anywhere I would like to go in her car, and so forth, and get acquainted. But being twenty-three and rather trained in certain aspects which—. It caused me to look down on that

a little bit, and I thought the better of it. Later on, I got well acquainted with Anna Louise, and she helped out very much with a lot of our music in the school.

I believe there were around a hundred to a hundred and ten students in the Carson high school. About eighteen of these were seniors, the junior class probably was a little more, and there were probably twenty-five to thirty or more freshmen, and as many sophomores. The faculty consisted of about seven people; the superintendent, Mr. [G. E.] Hofmann; the coach, Mr. Leslie Dunnells; Miss [Florence] Bea Bray, who taught English and maybe some languages; and Miss Oona Stautz, who taught domestic art, domestic science, and I believe some regular art; and a commercial teacher (I don't remember now whether that was Miss Wolverton or not. I've forgotten her name at the moment); and, of course, the language teacher, whose name I've temporarily forgotten; and of course, I handled the mathematics and science.

The school had an assembly room upstairs, which was used as a high school assembly, the laboratory, and the commercial room, and the seventh and eighth grade rooms. The first floor had the superintendent's and principal's office, [and] the rest of the grades. And the basement had the domestic art and domestic sciences, I believe. However, some of that was done on the first floor, also. And the coach was also in charge of manual training and mechanical drawing, and his room was in the basement on the south side. This small school seemed to serve the entire school population of Carson City in fairly good shape in those days. I believe the population of Carson City was somewhere around twelve hundred.

The equipment in the laboratory, at least, was fair, but I managed to get enough money from the school board to add to it from time to time.

One thing I took upon myself almost immediately on this job was to insure that I had reasonably good discipline. This took a little doing, but it didn't take long for the more unruly kids to find out that I meant business. From that time on, I had very little discipline trouble in the schools. In fact, I had very good cooperation.

I helped to organize the science club [in November, 1924]. They had never had a science club in the school, so that was one of the first things I did. Anybody taking chemistry or physics, and also, the general science student, could belong to the science club. We charged a small fee which helped us buy a few things. There was no barometer in the school, and the school board apparently didn't have the money to buy one, so we charged a few laboratory fees for the physics class and got a small fee from the science club, and we soon had enough money to buy a fairly good barometer. This was a mercurial barometer, and, of course, we installed it in the laboratory.

Some of the children were interested in music and knew that I played a cornet in the band, and they wondered if there wasn't some way we could get some kind of music going. My predecessor, whose name was Mr. [R. B.] Sherman, had had an orchestra of a type. But there were some of the students who could play in that orchestra, but he also had quite a few adults from the townspeople. It really was not a school orchestra. I thought we really should have an orchestra that belonged to the school. I was not qualified, however, to teach music, but since the children were interested, I thought it would be a good idea to see if we couldn't organize something. So we finally managed to get about twelve or fifteen of the interested students. We had a piano player, and a drummer, and a trombone player, two violins, two clarinets, two or sometimes

three saxophones,. and we were short on comets, but we had one good cornet player. I also played cornet and helped fill in. We managed to get enough money together to buy a few simple pieces. So I believe it was along toward the latter part of the year, we had this little orchestra organized. And about the first thing for which we played was a PTA meeting. I believe that must have been in the spring of '25.

The sports in Carson High School consisted [of], with the boys, football and basketball, and with the girls, basketball; and quite a few of the students participated in tennis and belonged to the tennis club. Carson's football team had been a state winner in the 1923-24 year, but this particular year, they did not do so well. Leslie Dunnells, the coach, did his best with them, however. The orphan's home field was used as a football field. There was no field. The school had no gymnasium. So we used the old armory [in] back of the capitol building, on the east side, for a gymnasium, and that's where the basketball games took place.

There was also a club formed among some of the single men and some of the married men and state employees called a Men's Athletic Club, where we exercised occasionally in the old armory. And we had our own basketball team. We didn't play any out-of-town games, but we did play local teams, which we organized among ourselves. This helped to while away the time.

Very shortly after school started, I began to hear about the PTA and was soon introduced to number of Carson City ladies, all of whom I presume were either mothers or grandmothers of the students of the Carson schools. I was told by Mr. Hofmann that, whether I liked it or not, I was required to attend the PTA meetings. He said, "Now, of course, we can't require that of all male

members because the coach, of course, has to do his duties with these kids about the same time the PTA is meeting." He said, "But you and I are stuck with the PTA." He says, "You won't find any men in there. It's all women. But," he says, "do the best you can, and make out the best way you can," which I managed to do. But frankly, I did not particularly enjoy being stuck for the PTA meetings. As the year went by—or, I believe it was a couple or three years later on, of all things, they made me vice-president of the blamed thing, and I had to preside every once in a while [laughing].

Teacher discipline in those days was rather severe—that is, the teacher's personal discipline. The teacher was supposed to be something of a model. He was not supposed to drink or smoke or go on wild parties. I pretty much followed those, although I didn't entirely quit smoking.. I had never been much on the drinking. What I did do was buy cigars instead of cigarettes, and I had one cigar every evening after dinner. I went down to Joe Rochon's cigar store and bought what they call Porto de Oros, which [are] cigars that had a very mild flavor, or mild smoke, and they were made in San Francisco. I believe that particular brand is not made any more.

I was curious, however, about the so-called speakeasies in those days. There were a number of them presumably in Reno and other places, where, if you were well enough known, you could manage to go in and get a drink. Some of the men I knew, such as Bill Holcomb and a fellow by the name of Fry and probably several of the others were talking about these speakeasies and stated that you had to be known in order to get into 'em.

I was very curious, and so they promised to take me over to Reno someday where I could see the speakeasies. Now, this all

happened probably early in the fall of '24, probably somewhere near the last of September or first of October. They took me to a place in Douglas Alley. The particular speakeasy was just across from what was called the old Mineral Cafe. The Mineral Cafe was a place where you could get pretty good meals very reasonably. And a lot of people who didn't have much money made it a habit of eating there. I joined Bill, and I believe it was Fry, and there may have been a fourth party, and we went into an outside door into a vestibule there, and opposite us, as we faced to the west I believe, was a closed and boarded window with iron bars on our side of the window. Someone (I believe it was Billy) made a tap or two near the window, and someone from the inside opened the shutter-like doors and looked us over. And he knew a part of the crowd, so he unlocked the door and let us in.

There was a regular bar with quite a number of customers, people in it, whom I did not know, but they were known to Holcomb and the others. I believe Holcomb and his friends had two or three drinks apiece. I thought it was best that I did not drink anything in the way of alcoholic beverages, so I had some kind of a soft drink, probably some kind of soda water. When everyone was finished, we went out the door (I think I was the second one out) just as the orphan's home kids were coming out of the Mineral Cafe. "Hi, Prof! Hi, Prof!" they shouted. I was wishing for a big hole to disappear [in], but I could do nothing but face it [laughing].

It probably took some time for me to really live that down. No doubt the word got around quite a few places because I heard about it from quite a few sources and none of the people being on the scene at the time. I sort of preached against drinking and smoking, although I smoked, myself, on the

q.t. But I think my preaching was pretty much laughed at after this particular episode.

Interesting things happened in our boardinghouse. There was a camaraderie there which did not exist in any other place, a lot of kidding, and the meals were good, sociability was good. Someone in the crowd (I believe it was Horn) thought up a little evening performance after dinner each night to have a little penny ante game—that is, draw or stud poker, dealer's choice. Well, quite a few of us joined in that. No one lost or made very much, but it was enjoyable. The biggest duck in the puddle was Mrs. Schulz herself. She would never miss a penny ante game. Unfortunately, she liked to call everything, whether she had a good hand or not. But I think she was probably the perpetual loser, and Horn seemed to be the winner. But, as I say, no one lost or won very much.

I was kidded quite a bit about writing so many letters to my girlfriend back East, the girlfriend being Ruth Fairley, to whom I was engaged. And I took quite a beating on that, especially from some of the old maids who were at the boardinghouse. I will not mention the names of those particular people now, after classifying them in this manner [laughing].

One of the boarders was Mr. [Maynard B.] Hanna. I've forgotten his first name. No one used it anyway. They all called him "Hanna." I believe he was an office engineer at the state Highway Department. Hanna was an expert on tennis. His own playing was not particularly good, but he was an excellent tennis coach. He helped many of the young people get started in tennis, and he corrected their faults. He would save up all of the old tennis balls (I've gone with him many times; he also taught me some things about tennis). All these old tennis balls were gathered together in a pasteboard box,

probably as many as four or five dozen. He would instruct a student on serving alone, just stand on one side of the court and do nothing but serve until all those balls were used up practicing serves. Then he would have them practice volleying and cutting, and lobbing, and all the other things that made a good tennis player.

I believe Mr. Manna should be given credit for the performance of some of our young players, such as Emma Berger, Doris Johnson, Mary Rochon, Douglas Busey, and Ed Ducker. I believe Douglas Busey became the state tennis champion when he was in college. Ed Ducker was pretty fair, too, and I believe he and Doug won quite a few of the doubles matches. Mary Rochon, as I recall, was also a very good player, and I believe at one time she was state champion. Some of the older people, such as Hazel Loy, also, to the best of my knowledge, was a one-time state champion. Hazel Loy's maiden name was King. The King family was quite well known in California as tennis players. I recall Mr. King, a brother of Hazel Loy, who was a commercial vegetable grower in the area which is now Hayward, came over here for the western Nevada tournament. I remember refereeing one of his games. He was a very good tennis player. Howard Loy played tennis, but he was not nearly as good as a male player as was his wife on the female end of it. But Mr. Hanna should be given a lot of credit for the tennis. Later on, he quit the Highway Department and began selling clothes and shoes. He seemed to like that, and soon he left the area, and I really don't know just what happened to him.

The names of Melvin and Rose Fodrin should also be added to this list of good tennis players. There probably were quite a few others, but I don't remember all of the names at the present time.

In charge of the state Department of Education at the time I entered the Carson high school was W. [Walter] J. Hunting. And his district deputy was Merrill [J.] Burr. And the Carson school board consisted of Frank Meder, the clerk, Richard Barber, and Wallace Evans. This was changed later on, in 1926. There was a contest in which Barber and Evans were replaced by Dr. [E. E.] Hamer and [George] W. Borden. Mr. Borden was state Highway engineer at the time.

The roster of high school teachers was as follows: of course, there was Gus Hofmann, who, in addition to being superintendent, was also high school principal. Then there was Leslie Dunnells, who handled physical education and manual training; Florence Bray, the English [teacher] (she may also have taught civics); and Oona Stautz, who handled domestic science and girls' physical education (I believe she also handled some art); and Evelyn Jones, who taught commercial and Spanish. Miss Jones, later, I believe in the summer of 1925, married Ralph Twaddle, and she continued in the school, I believe, for two years after that time. And there was Marion Lothrop. I've forgotten at the moment what her subjects were. Of course, I had the science and math, and upon organizing this little orchestra, I had that for all five years that I was in the school.

The grade school roster I cannot remember too well. I do know that Martha Gleason was the principal of the grade school and taught the eighth grade. Maude Taylor had the seventh. The fifth and sixth grades made some changes. I can't remember for sure just who was teaching at the time I came in 1924. But for a number of years, the primary grades and the fourth grades were under the same teachers. Mrs. Benton had the fourth; Mrs. Dorsey Noteware, had the

third; Miss Lizzie Sanger, the second, and, I believe, Miss Alice Bryant, the first.

Gus Hofmann made a good principal and superintendent. [This was to] my thinking. He interfered but very little with my classes and teaching. In fact, I don't recall that he ever made any direct effort to supervise. However, I did enjoy the jokes he had for me, but he usually would come by my door, and if I weren't busy, would drop in and tell me the latest funny story. I got along fine with Gus Hofmann and enjoyed working with the man very much. He had a pleasant disposition. However, at the end of the year, he had some kind of trouble, apparently a hangover of some kind with the wife of one of the prominent state [elected] officials. I don't know just what the trouble was, but it had something to do with music at an earlier date, and due to the political nature of the thing, he was relieved of his job at the end of the school year 1925. In the meantime, when Miss Jones and I got wind of what was happening, and knowing that Mr. Hofmann had applied at Truckee, we wrote letters up there, giving our recommendations as teachers working under this man. I believe that probably helped Gus Hofmann in some small way to secure his position in Truckee. As I recall, he was in Truckee for a number of years after that time.

In this first year, I was made teacher adviser for the freshman class. I outlined my program in such a way that I would try to make discipline the least possible problem, and try to make as good an appearance before a class as possible. My discipline problems were not bad. There were a few times where I had to roughly handle a few of the kids, but after doing that, things settled down very quietly. One way I could keep good discipline was to call attention to the unfairness of some one or two students taking up the time of, say, twenty other students, and multiplying the

five minutes there by the twenty. There was a hundred minutes lost to that class, collectively. That shaming proposition seemed to help considerably in maintaining good discipline.

The five years that I taught, I never taught in any other way but on my two feet with a blackboard behind my back. Never could I feel that I was getting things across by being seated. By standing, you could look out over the whole room and see what was going on at all times. And as far as I was concerned, there was no other way to teach.

Sometimes my assignments may have been a little tough at first, especially in physics. However, some of the students I had were excellent students and would run through these assignments without any trouble. Of course, like all problems teachers have, there are others who have a tough time in math and science like physics. I told the students they were welcome to come in after school for help, which they did, particularly some of the girls having trouble with math. It was a problem in getting those kids through with passing grades, but I believe I did help them out.

I had learned something about the use of objective tests. I thought that was the most fair way of testing. The only objection I had to using objective tests was the fact that the kids did not get the practice in the use of the English language that they would have in the essay-type. Therefore, I mixed the essay-type along with the objective tests. The objective tests, of course, consisted of true-false, multiple choice, and filling in blanks, and that kind of thing. The one thing I liked about it—I could plot the curve and grade on the class, rather than on my judgment. But the biggest problem was duplicating the tests. We had one of these old hectographs with the gelatin, and usually it was always a problem to get

good-looking copies for such a test. Modern teaching aids were scarce in those days—that is, the aids that teachers have at the present time, such as excellent duplicators and TV, radio, and so forth.

My program during practically the entire five years at the high school consisted of something like this: at eight o'clock in the morning, Mondays, Wednesdays, and Fridays, we had school orchestra. This was done at first just for fun, but finally the children wanted credit. Although I was not qualified, I received a bona fide certificate from the state Education Department in the mail one day. From that time on, the orchestra members got some credit. Every year, I had Algebra II, geometry, and general science. And most years, I had Algebra I, also. Physics and chemistry were alternated. The first year was physics, the next chemistry, and so on, as long as I taught.

There were considerable social and extracurricular activities in the high school. I might mention those at this time. At the beginning of the year was what they called the “Hi Jinks.” This usually was held about the second week of school, as I remember. At that time, the freshmen would have to wear sort of outlandish costumes to school, and sometimes their face was painted. I believe, also, they were supposed to make paddles for the seniors to chastise them if they didn’t obey the orders. At the end of the week, on a Friday, there was a meeting in which the seniors sat up on the podium as judges, and the freshmen down below them, and the rest of the school, the faculty, looking on. These freshmen were tried one-by-one for their misdemeanors and were handed out certain penalties. At the end of the day, there usually was a dance given in honor of the freshmen. There was some hazing which took place. We heard about it by the grapevine route. Sometimes some of

these boys, especially the freshman boys, were taken out in the country and unloaded from a car and allowed to walk back. And there may have been a little physical injury occasionally.

Another annual affair was the painting of the C; the letter C on the hill back of the school was painted with whitewash. This was usually done sometime in May. The whitewash and water, lime water, was carried up—or, rather than carried up the hill, it was passed up the hill in an endless chain from student to student. Mr. Sherman, my predecessor, surveyed the C. And the building of it, the placing of stones, I believe, was done by the students under Mr. Sherman’s direction in 1922 or 1923.

There were also class dances from time to time. A junior prom was always held. There was always a senior play, and what was called a “senior cut day,” which occurred near the end of the year, when the seniors were allowed to cut school for a day and go off on a picnic and rendezvous some chosen place, with chaperones, of course. It was customary at that time to have chaperones for all school doings, extracurricular or not.

Although the school was small, it had quite a few organizations, such as clubs, and there were regular club meetings. One such club was the La Sool Club, was for the Spanish students; the science club. Then there was a student government group, called the Board of Controls, which included the student body officers and the superintendent, the principal, and one faculty member. There was also an athletic society called the Block C Society, which included both boys and girls.

In those days, there were some activities in the Carson City vicinity which you could classify as manufacturing. I thought it well to take my science classes to visit such places. One was the process of making ice. This

was done in the old Carson brewery, which was just across King Street from the school. Arnold Millard had charge of this and was very courteous in showing us through, showing the kids how the ice was made. Of course, this was long before the advent of the electric- or gas-run refrigerator, at least in quantity.

In those days, also, there was city gas supplied to Carson City (I say city gas; it was supplied by a company). This gas was made by heating oil up to around thirteen hundred degrees— that is, crude oil, and running the resulting gas through a scrubber or a washer, and then through trays containing ferric oxide to purify it. The purified gas was stored in a tank with the pressure regulated, so about a quarter of a pound of pressure was on all the gas lines wherever the gas was supplied to the houses in town. A man by the name of Fred Frisbie was in charge of that gas plant. It was a one-man operation. Frisbie was always very cooperative in taking the kids through. I usually took the general science through this.

Frisbie was very fond of jokes, so he had things all arranged so when the kids came in, some fun would happen. He usually had the boiler heated up so it was all ready to pop off. He also had tools scattered about his workbench, and each one was wired up so it would give the kids a shock when they picked one up. Fred enjoyed this very much. And every year, it was the same old story. Usually, after the girls were right around the boiler, in explaining, the thing would pop off and made such a noise that they would all shout and yell. Anyway, I think the kids learned something about how gas was made.

And, too, the Virginia & Truckee foundry and shop was running full blast in those days. In the shop, of course, they repaired their own locomotives and cars. But they also ran a foundry, and they used scrap wire and made

castings for the mines and other places. And the pouring of those castings was quite a sight to watch. The classes I took through the V & T shops always enjoyed watching the pouring of the metals.

There was a man by the name of [Fred] Smith, who was an expert at making the forms, in which these were cast. And that was explained to the children. Harry Brooks ("Tubby," we called him) seemed to have charge of the pouring of a casting. He was a big, strapping fellow who played in the Carson City band and later became sheriff.

About 1925, I believe, and '26, when I had the first chemistry class, Mr. Borden, who was then on the school board, arranged transportation so that the entire class was taken up to the American Flats on the Comstock to go through a huge milling operation. This was very interesting; however, this milling operation apparently did not succeed, because after just a few years, it shut down. Nevertheless, it [was] an applicable piece of work, as far as a local chemistry class was concerned, because many of those boys might in the future become chemists or assayers, or have something to do with metallurgy.

I believe it was around 1925 or 1926 in which the Philadelphia Philharmonic Orchestra visited Reno, and I arranged that the entire Carson high school orchestra attend that affair.

I believe our little science club did some good because it gave the youngsters a chance to express themselves, and they would present little papers and talks from time to time. There was also some contests put on in the state by commercial companies. And in 1925, Douglas Busey and Joe Cavell won first and second places in the statewide chemistry contests. Papers of fairly good content were given in a science club meeting by Grant Bowen, who

later became Judge Bowen; Walter Mulcahy; Walter Hunting, who later followed in his father's footsteps, more or less, in education, and after graduating from the College of the Pacific, became a teacher.

After my college training, I had become quite a believer in what you might call the ideal of community service. Accordingly, I joined several organizations in Carson, which I have probably mentioned before. I thought to do so would foster good fellowship and broaden acquaintances, all of which would stand in good stead for a teacher. I also got around to attending the Methodist church quite early in the game. And lo and behold, one of the first persons I met was Bonnie Reid, superintendent of the Sunday school, and she inveigled me into taking the Sunday school class of subteenage and teenage boys. Well, that I did, but in order to qualify myself, I had to bone up on the Bible. And I really read the Bible from cover to cover before I got into the program too far. I had quite a few high school boys who were Methodists. To mention a few, there was Victor Clyde and Norman Noteware, John Newman. There were others whose names I can't remember at the moment. I took the boys on occasion on Saturdays out on picnics, sort of nature studies, and tried to tie in something with the Bible as it relates to nature. I don't know whether I was successful or not. I had to drop this after my first year due to the interference of too many other things.

And, of course, I had joined the tennis club and took an active part in it. Although I was not an expert player, I did enter some of the tournaments, and I refereed in some of the tournaments.

We, of course, had teachers' institutes. And the first institute I attended was early in

the fall of 1924. I believe I had ridden over with Gus Hofmann and Mrs. Hofmann. The first person I saw when I got out of the car (I believe this was held at the Billinghurst junior high, at that time) was Margaret Cornell, a schoolmate of mine at Western, the girl to whom Erwin Gray, one of my Western pals, was engaged. And Margaret and I had some time during that first meeting to discuss old times, as we called them. She still had not recovered fully from having lost Erwin, to whom she was to have been married.

Later on, after obtaining a half-interest in an automobile, I came to see Margaret a few times. She had a small school out at what is called the Lockwood ranch, about four miles east of Sparks, down the canyon. There was no bus service, no consolidation of the schools in those days. Each little area had its own country school, and I believe Margaret had five or six students.

During this early period of September, William Jennings Bryan appeared in Nevada and gave a speech on the capitol steps at Carson City. I can't remember now what his subject was, but I did stay for part of the speech.

I mentioned earlier that my roommate, Cecil Carroll, had landed at Lovelock with a job, and another college acquaintance, Jim Patten, had landed in Eureka as a teacher. I kept in close contact with Cecil. We met in Reno after our first payday and decided to look over the used car situation. We finally found a secondhand Chevy, I believe a 1923 model, which seemed to be in pretty good condition, and the cost, as I recall, was around three hundred and fifty dollars. And we had enough for a down payment between us, so we took the car.

The car was a regular old touring car, left open usually in good weather, but it had the side curtains, which could be used an cold

weather. No heater was available. We had to decide who was going to use the car when, so we finally ended up that I took it for the first month; then we arranged at different times to swap it. This led to some interesting things.

When I had the car, I made it a point to see Lake Tahoe at the first opportunity. Hulbert Horn, a graduate of the University in 1924 (the University of Nevada), in civil engineering, was employed at the Highway Department, and he was also a boarder at the Schulz's boardinghouse. He and I decided we'd go around the Lake, so we took our lunch and started around. All the roads were dirt roads. We went up the old Osterman grade, as it was called, which was on up King's Canyon, on up through a heavily timbered area, the timber all being second growth because the old-timers had cut down all the first growth for timber and for fuel. And it went over the summit about the same place as it does at the present time. However, this Osterman grade was presumed to be the most scenic grade in America. When you're up on the east slopes of those high mountains, you could look out over Carson Valley and the other lowlands. It was a very good view. Unfortunately, two years later, what was called the Clear Creek fire swept through this area and denuded most of it of timber. Anyway, we arrived at Glenbrook, stopped there for a short time. In those days, the road went down on the north side of that gulch leading down from the Sierra to Glenbrook, rather than on the south side, as it does at the present time. And the road ran directly in front of the Glenbrook Hotel. In later years, the manager put traffic breaks there to slow the speed down to ten miles an hour. Those breaks consisted of bumps about one foot high and spaced about fifty feet apart.

We went on to what was called Lakeside, which is the white building, still standing, about three quarters of a mile north and a little

northeast of this hotel. We passed it and were forced to stop at the state line because, even in those days, there was a California inspector to look over our car for fruit, vegetables, or other things which might contaminate the California crops. We had four oranges aboard. He said, "You can't take those." We were not going to leave those with him, so we stopped and ate them on the spot before we left. We went clear on around and I marveled at the sight of Emerald Bay. I believe we spent the entire day. We finally went clear on around to the tavern and on around through Tahoe City, and above Brockway, and back up over that horrible old grade, which I believe we now call Route 28.

Roads in those days were something to be talked about. However, we didn't know any better, and wherever there was no bumps or mud holes, we called the roads excellent. Most of the roads up over these granite mountains were in fairly good shape. They were maintained by the old-time, horse-drawn blades, I presume, later on by mechanical equipment. However, the Tahoe road was always closed in those days over the winter months.

I wrote about the beauty of Lake Tahoe to Ruth Fairley. She was, at this time, teaching in Canyon City. She wrote me of what had happened to her in Canyon City. It seems there was a little conflict there between the Protestant people and the Catholics. At that particular time, all the teachers had joined the Ku Klux Klan. So my future wife, Ruth, was, at one time, a KKK Klanswoman. I promised her that when we were married and [she] first came to Nevada, the very first thing I would do would be to take her up to see this beautiful lake.

As long as I had the car, I was able to make some of the field trips with the [high

school] teams. Sometimes we'd take a few players. I became very well acquainted with Leslie Dunnells, our coach. He was also an attendant of the Methodist church, probably was a much better Methodist than was I. In any event, one time, we went together out to Fallon (I believe it was along in the winter) for their basketball game. And I recall how rough the road was between Fallon and Carson City. It went on through Mound House on out to what is now Silver Springs (there was nothing there at the time), and on over the bumps and rough places, and some places sandy soil, some places clay soil. And we finally got to Lake Lahontan, where the road was a little better on into Fallon.

I recall that it was not possible to get the team back the same day, so everybody had to stay overnight in Fallon. I recall going around with Dunnells to see the boys after they were put to bed. Two of the boys on the team (I believe it was William Jaggles and Benson Johnson, who were also in my orchestra at the time) were bedded down in a room with about six blankets over them and an oil heater going full blast in the room. And I can remember Dunnells's explanation: "Hm! The hardy American Indians, and look at 'em!" [Laughs]

The following day, we decided we'd see a little more of the country. So on our return trip, we decided we would come back through Reno. So we drove from Fallon through Hazen. I don't believe we made Fernley. Fernley was detoured, and the road went through Wadsworth, and from Wadsworth on down the canyon to Sparks and Reno. The road was rocky and rough, but rather sound, not too many chuckholes. I was beginning to learn at this time what the old-time roads were like in Nevada, so that I could make comparison in later years when I was in the Highway Department.

I've forgotten when I [exchanged] the car so that Cecil would have a chance at it, but I believe it was sometime near the end of October. Then by—about the first of November, it was my turn to receive the car, and we had arranged that I would meet Cecil with his football team in Yerington. My problem was to get from Carson to Yerington.

This was one of the most interesting trips, from a historical standpoint, that I've ever taken. I bought a ticket on the Virginia-Truckee to Mound House. At Mound House, I obtained a ticket on the Southern Pacific, which carried me down to Wabuska. [At] Wabuska, I bought a ticket on the Copper Belt, which took me to the station opposite Yerington, whereupon I got on the stage and made the other mile or so into Yerington. I believe it required about three hours to make the trip. I had stayed for the game and stayed for the dance later, and happened to meet an old Bishop High School acquaintance of mine by the name of Elva Fitchit. I believe she was married at the time. But anyway, we had a dance and talked over old times.

The following day, I drove back to Carson, using the route through Wellington and Gardnerville. That took me about two hours, I believe. In those days, the roads were built for a maximum speed of about thirty-five miles an hour in the good places. The cars wouldn't do very much more than that.

Having known Margaret Cornell and having known about her relationship with my pal, Erwin Gray, I made it a point to visit with her whenever I had a chance. She was sort of lonesome. I don't believe I was lonesome. I had made quite a few friends. But I did try to get over to see her every once in a while. We sometimes would go to a show; sometimes we would simply go to dinner. I always seemed to have kind of a degree of bad luck whenever I went with Margaret anyplace. I recall one

time, she said, "Would you like to have some California special food for dinner?"

I said, "Well, let's try it."

She said, "I know it's something you're not used to because you didn't have it in Colorado." So she ordered artichokes and cracked crab. Well, I have always had a very voracious appetite. By the time I got through fiddling with those artichokes, dipping them a leaf at a time into the mayonnaise and pulling off what was edible, and trying to dig that crab meat out, I was really hungry.

Then there was another time when I was having dinner with Margaret, when lo and behold, after I'd eaten half of my salad, here came the famous inchworm. I tried to call Margaret's attention to something else 'til I had a chance to get him off my plate. Needless to say, I didn't finish the salad.

Still another time, I asked Margaret to come on over to Carson City to a dance. I would go over and pick her up, which I did. On the way through Reno, nearing Steamboat Hot Springs, we noticed smoke and a heavy blaze. The old hotel at Steamboat was on fire. This probably was in the late fall or early winter months of [1924-25]. So, being a good Samaritan, I stopped the car and decided I would go over and see if there was anything I could do to help. I met another fellow about my age there. We looked around and found a car in the garage adjacent to the hotel. We were sure the car and garage both would be destroyed. So we decided to loosen the brakes and push it out. I got in front of the car. I didn't realize there was a manhole with a foot and a half of water underneath it. I had my only good suit on at the time, and in pushing the car out, as pay for my being a good Samaritan, I got up above my knees in muddy, oily water. When I got back to Carson, I had to borrow a suit of clothes so I could take Margaret to the dance.

The first Christmas vacation was rather an interesting one. I had the car and was to deliver it to Lovelock. I did not have a chance to do so until Christmas Eve. So Christmas Eve, 1924, I drove from Carson to Lovelock. And for the first time, I traversed the road, if you want to call it that, between Wadsworth and Lovelock. This road was made by blading off the old abandoned railroad grade. Old railroad spikes were still present. Before I got to that grade, however, it got very cold and the radiator froze, and I had to turn around and go back to Wadsworth and get enough alcohol to lower the freezing point so that I could make the trip. But after I got onto this old railroad grade, something happened to one of the tires. I presume I hit one of those old railroad spikes, and the tire was flat. It was miserably cold, but I managed to get it changed. There was no way to get heat in the car. Those cars in those days were not heated.

I got into Lovelock Christmas Eve, just prior to midnight. Cecil and his girlfriend were about to send out a hunting party for me, but I made it all right. We stayed all night with Cecil in Lovelock. Next day—I believe that night, we decided we ought to go to Tijuana. We took inventory, and we each had about thirty dollars apiece. That wasn't very much money, but it was surprising how long it lasted in those days.

So, the following day, Christmas day, we drove down to Carson City, and, I believe, left Carson City at noon and went on down what is now [Highway] 395. We finally made Hawthorne. But we didn't know how narrow the road was, or how dangerous it was because it was dark. We could see these rocks painted white up along on the outside edge of the road, which was just above the Walker Lake shore. In our later years, we could see that it was a very dangerous road to drive. Of course, at night, we couldn't see where we

were. Those white painted rocks, though, were a good guide. We got into Hawthorne very late, and there was not very many facilities there, but there was the old-time hotel with the potbellied stove with a tobacco chewer sitting around it in the lobby. We managed to stay all night, and the next day set out for Los Angeles. I had already written to my Uncle Charles, who now was stationed in San Fernando, and he said he would be glad to see us and wanted us to spend a couple days with him before he went on south.

However, the best we could make the next day, was Lone Pine. The weather was very, very cold. And in order to warm ourselves, we would take turns getting out and running for a little while. We decided we were losing a lot of time (there was no traffic), so we altered that performance to some extent. One fellow would get out of the car, start running, and the other fellow would drive it ahead perhaps a quarter of a mile and then leave the car and get out and run ahead. That way, we doubled up on our time. But we managed to keep warm. We also had to replenish the alcohol supply. However, as we neared the banana belt in California, there was no need to warm up and no need to worry about the car freezing.

We stayed with Uncle Charles two or three days, and we had to play golf with him, my first chance to play golf, my first experience with it, and just about my last. We, thankfully, received free board and room because our money was not too plentiful.

We then left San Fernando and drove on down to San Diego. We stopped off at San Juan Capistrano, which had been made famous by the date on which the swallows return, proceeded on to San Diego, where we stayed in a hotel room. The following day we drove to Tijuana, crossed the line, bought two beers, I believe, but there was not much there, and there was not much we were interested in. So

we simply turned around and came back and we left San Diego the following day, and we were surrounded by fog before nightfall. We were down around Long Beach. We couldn't tell for sure where we were. But the fog was so dense one of us had to lie on the running board and watch the edge of the pavement while the other was driving. Sometimes we could follow the taillights of the car ahead of us. I'll never forget that fog.

We also had some trouble getting through Los Angeles. Being green country boys, we didn't know much about traffic cops. There were no street lights, no on and of f lights in those days. The traffic cop directed the traffic. One time when I was driving and got out in the middle of the street when I shouldn't have, we got a severe eating out by a traffic cop.

We stopped over again for one more day at San Fernando with Uncle Charles and Aunt Nell and resumed our trip back home. But this time, we thought maybe we could leave Bishop and come on through Bridgeport if the snow weren't too deep. So that is what we did. We came on through Bridgeport. The snow was deep, but we managed to make it. We left Bridgeport and took an old road that eventually got into Wellington. The last gasoline was bought at a station below there, and that was the last money I had. Cecil had already run out of money. However, we managed to get to Carson City on what we had left. I borrowed five dollars from one of my friends and gave that to Cecil so he could make it to Lovelock. We had an old box camera and took many pictures of our trip. This was something for us to remember. The roads, as I say, were pretty miserable in those days until we got down in the Los Angeles vicinity, of course, where we had pavement. And we had pavement—some good and some bad, as a matter of fact—between Los Angeles

and San Diego, and between San Diego and Tijuana.

During the late winter months of 1925, school life was down pretty much to a routine. I cannot think of anything at the present time of particular note. However, I did use the car whenever I had it to travel quite extensively to places like Virginia City and Carson Valley and other places where I had not been before. Virginia City was very interesting to me. At that time, the old buildings and relics were not commercialized like they are at the present time. There was no such thing as a gift shop that I can recall. As a matter of fact, I remember some of the Carson women going up there, and some of them were caught sort of pilfering around for antiques. A lot of those old buildings and houses were open at that time, and it was not commercialized to the extent that it is at the present time.

Along toward spring, when the spring vacation time came, I decided to go down to San Francisco. And while there, I thought I would go on down to San Jose and visit Margaret Cornell. She had quit teaching at the little school east of Sparks. I believe she had some kind of illness which kept her away.

Odd things happen. I had gone down on the train, and, to me, I was fascinated by the Benicia ferry, which was in full operation at that time. And again, at that time, the way to get across the Bay from Oakland to San Francisco was by ferry, which was all new to me and very enjoyable. I hadn't gone very far across the Bay when I noticed a girl up ahead of me. She was a Western State College girl I'd gone to school with. Her name was Catherine Willard. She recognized me, however, before I recognized her. I believe she was going to the University of California part-time and doing some practice teaching part-time. I never saw her again after that time. I spent a day or two in San Francisco, then went on

down the peninsula to San Jose and spent one day with the Cornell family.

During all my years in the school at Carson City, I played in the Carson City band. The first director was a gentleman they named Prof Smith. I can't remember his first name. I believe he directed it until about 1926. And I can't remember whether he left town or whether he passed away. But after that, Dutch Berning, who was, I believe, the draftsman at the state Highway Department at the time, took over as director. Dutch played solo cornet in the band, and he took over the directorship of the band and held it until quite a few years later, when he was transferred to Las Vegas as district engineer. I thus played with the band every Decoration Day. It was a custom for the Carson City band to lead a procession with the various Veterans of Foreign Wars out to the cemetery, and I remember we always played the old funeral march, "March Funebre." This usually happened about the time school was out, or just prior to the time school was out.

As soon as school was out in 1925, Cecil Carroll and I arranged to drive back to Colorado where we'd continue our studies, and we would pick up Jim Patten in Eureka, who would also go back, but Jim was to stop off in Grand Junction.

By the way, just a word about Jam Patten. He taught in Eureka just the one year, then I believe he finished his education somewhere in Colorado and eventually became quite prominent as a speaker, finally became president of the National Farmers Union and made quite a substantial salary and was quite famous in that particular area.

Cecil had the car, so he came down to Carson and picked me up with my belongings. I believe we made Austin the first day. The

car could not make too much speed, and the roads wouldn't allow it. I recall the type of roads. Out beyond Patton, in crossing some of those swamp areas, you went from sand to mud. And like many other places in those days, there was not a single road, but many roads. You could take your pick or make a new one. Sometimes you were almost stuck in a mud hole, and if you didn't go too fast over the bumps, you wouldn't break a spring. But that was always a possibility. I remember the good roads always seemed to be on the little summits. The little summit we were glad to see right beyond the swamplands of the Carson River Sink. That was a very good road. The road was not too bad around Frenchman's, and it was good over the little summit before we hit Austin.

We stayed all night in the famous old International Hotel at Austin. That was an interesting place. The walls were very thin. You could hear all the conversation on either side of you. People did not get up very early there. We got up early, and we tried to get our car out of the garage, but it was locked. We had to wait until eight o'clock for the garage man to come around before we could leave. And the Chinaman, the cook, hadn't gotten breakfast yet, so I think that the time we did leave was around nine o'clock.

We fought our way to Eureka over some of the worst roads I have ever seen. There were some wet places between Austin and Eureka, and we almost got stuck in two or three of them. Then again, the higher ground gave us pretty good traveling conditions. But once you got down in the lowlands, with the silt flats, sandy places, or wet places, here are all these various roads, and it was a case of take your pick. But you did not make much progress. We arrived in Eureka in time to pick up Jim Patten, and as I remember, we continued, then, on to [Ely]. Just after we got over the

summit from Eureka, there was highway construction going on. Coolidge and Scott had the contract, as I found out later. There was not much traffic, so when the boys got ready to blast, they usually just let it go. We were going along until we saw a man raise up out of the brush and wave his hands and wave his hands. I think all three of us knew right at the moment what was going on. There was a blast about ready to go off, and we were about ready to go over it. Carroll and Patten jumped out of the car, and one ran one direction, [one] the other, and I thought I could make better progress with the car, so I ran it down through the brush and got out of there. Sure enough, it was just a few seconds after that when this blast went off. In those days, they didn't think much about taking precautions, but there was very little traffic on the road. The roadwork being done was all being done with teams. I don't recall seeing any trucks at all, [just] teams and Fresnos, and scrapers, and hand labor.

We continued on to Ely, and stayed there all night. We did a little walking around the town and found ourselves in the middle of the red light district before we knew it. Quite a few of these gals were standing out at the doors and beckoning, and so forth, but we resisted the temptation and went on to bed.

The following day we left Ely and got as far as Baker, Nevada, [and] decided we'd stop long enough to take in the Lehman Caves. Governor Scrugham had made quite a thing of the publicity of Lehman Caves, and there was a caretaker there and a guide. So the three of us went through the Lehman Caves and found it was so late we did not dare go any further. We stayed all night at the little hotel in Baker, much to our discomfort. In the morning, we were scratching the bites and looking for the bugs. The place was infested with bedbugs.

Roads in those days were simply roads. You couldn't call any of them highways. There was very little pavement, if any, anywhere. We chose the shortest possible route to Grand Junction, Colorado. Upon leaving Baker, we made Grand Junction through various roads, and some of them no more than trails, via Milford, Cove Fort, Richfield, a fairly good-looking town, Salina, and a little place called Emery, to Price, which was a fair-sized town. Thence via what is now U.S. 50, to Green River, and on to Fruita, and Grand Junction. We left Jim off in Grand Junction (he lived there), and Cecil and I were guests at the Fairley residence. Of course, I was engaged to Ruth. We spent a pleasant day or so there. Ruth and I had not come to an agreement on just when this wedding would be taking place. I owed quite a little bit [of] money, and I still was not quite out of debt from all my college debts, and so forth. So as far as I was concerned, putting it in the future was—the farther in the future, maybe, the better. Nevertheless, I certainly did want to marry Ruth.

Ruth had taught in Canyon City, but she gave up that job to accept one in Grand Junction. So the following year, she was to teach third grade under Superintendent [R. E.] Tope, in Grand Junction. Just a word about Mr. Tope. He was a very fine school man, and because of his experience and ability, he was used at Western State College as a summer school instructor. I recall taking a few courses from him. I believe high school administration was one of them.

Cecil's mother and father lived at Mack, Colorado, a little town west of Grand Junction. We drove out there for a brief visit and continued on to Gunnison, where Cecil was left off at the Rovere ranch. Mrs. Rovere was Cecil's sister. I went on with the car to Parlin, and on home to the ranch, where I had a short

visit with the folks, then returned to Gunnison to resume graduate studies in educational subjects. During the summer, of course, I made a couple of trips to Grand Junction to see Ruth.

To the best of my knowledge, the courses I took at Western State College during the first term that summer were more on philosophy of education and high school and grade school administration. One of those years, I took sociology. I can't remember whether that was in 1925 or 1926.

The latter part of the summer was spent at home helping Dad put up the hay. Of course, I had to leave the latter part of August. So Cecil and I drove back to Lovelock and Carson City, I believe pretty much the same way that we had come.

Upon return to Carson, I found that Charles Priest had become superintendent of schools, and, of course, principal of the high school. Mr. Priest had served in World War I, and I believe he'd been a captain, possibly a major, in the Army. He was a graduate of Vanderbilt University with a bachelor of science degree, and of the University of California with an A.B. degree. He was married to a lady from Tennessee, which was also his native state. This lady's maiden name was Ellen Goodrich. I believe the Goodrich family was related in some way to the famous Goodrich tire people. They had two boys, Dan and Charles. Mr. Priest had been principal at Eureka, Nevada, and as I remember, was employed in the state Department of Education at the time he took the superintendency of the Carson schools. Mr. Priest had made quite a reputation in Eureka, and his recommendations apparently were very good. Nevertheless, he was severely handicapped by a hearing problem. I know that that was probably about the worst condition he had to contend with, was his own

hearing. He did conduct meetings, not too many, with his teachers, and he often spoke quite at length at PTA meetings. He spent some time supervising classes, but would not interfere in any way. He would often try to help the best he could with his hearing handicap.

Having taught one year, I was pretty well accustomed to the routines and to the methods—to my methods, at least, of teaching, which I had established. I don't recall of any particular events of outstanding nature. I did have some very good students. As I've mentioned before, some of them won prizes for papers. This was the year which chemistry instead of physics was taught, and it was also the year in which Mr. George Borden had arranged for the high school chemistry class to visit the American Flats mill.

I recall of one thing that happened that winter, which was a quite interesting thing. The show No, No, Nanette came to Reno. I believe it was in January. I had started out to go there, but had car trouble and was picked up by Dick Windele of the state Highway Department and brought back to Carson so that he could pick up another man by the name of Monroe, and the three of us rode over to see No, No, Nanette. In the meantime, I had left my car out in the field by Bowers Mansion, where I'd slid off the road and through a fence. I had to go back the following day and pick up the car.

I'd become quite friendly with Hulbert Horn, who was in the Highway Department, and we did quite a few things together. One thing I recall. We decided along in the spring, probably March or early April, that we would like to go up to the top of Snow Valley Peak west of Carson, make ourselves a pair of homemade skis, and ride down. This we did. We used barrel staves and flat lumber

and fastened the barrel staves onto the flat lumber and made guides (we did that in the school shop), carried the skis to the top of Snow Valley Peak and rode down in a careless manner without stick or any other means of guidance, and luckily we were not killed or injured.

One little experiment we did on this trip was to find out if we could ski over the loose pine needles. Horn found one area which was quite free of snow, and I watched while he skied down through that. He went so fast when he hit the pine needles that he fell, stumbled, fell, and was down on the ground right away. In those days, there were no ski lifts, and if you wanted to do any skiing, you got up the hill the best way you could. This was late in the spring. Of course, the lower elevations were all bare of snow.

This year, I was also well acquainted with a young fellow by the name of Earl Fordham. Earl's father was quite a noted prospector. I think he had been in the Elko-Lovelock area. Earl was, at the time, I believe, working with the state Highway Department. We made several prospecting trips together. I recall one time we walked up to what is called the "D," a lava formation north of Carson on a sidehill. I also recall that on the way up, we ran into a broken-down still which had been ruined by the prohis, this being the days of Prohibition.

Carroll and I made the usual trades with the car, taking turns at it. Carroll had become engaged to a Lovelock girl by the name of Thres Haughney. Thres and Nora Haughney were twins, and I believe there was one or two more members of the family. Mr. Haughney had come out from Colorado at the time the union men were all run out of Cripple Creek, and he settled in Lovelock and did quite a little of mining there. He showed me some marvelous gold specimens that he had

obtained while he was working some of his claims in the Lovelock area.

I remember taking a trip with Cecil and Thres and Nora Haughney up to a place called Nightingale, which was in operation at the time. And there we were able to see the men at work and see them panning the rich gold ore. I don't know just what happened to this mine. I've never been back there since.

At the end of school, Cecil and I again made the trip back to Gunnison, following just about the same route we had taken before. I don't recall whether Cecil went to summer school at this time or not. I believe he helped his brother-in-law on the ranch for a while, but he may have taken a few subjects.

I stayed for the first session of summer school. The subjects I took at the time, I believe, were advanced psychology, and perhaps philosophy of education. I also took a course under lava formation north of Carson on a sidehill. I also recall that on the way up, we ran into a broken-down still which had been ruined by the prohis, this being the days of Prohibition.

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I stayed for the first session of summer school. The subjects I took at the time, I believe, were advanced psychology, and perhaps philosophy of education. I also took a course under Mr. Tallman, who was the superintendent of schools at Trinidad, Colorado. This course I enjoyed very much. It was practically all mathematics, and the title was the Fundamentals of Statistics. It came in handy in my teaching experience later on, and also in my highway experience in figuring beams, deviations, percentile ranks, upper-lower quartiles, and Pearson's coefficient of correlation. I applied this the following years to many of my school grades.

Ruth paid a visit to our ranch during this summer, and at that time, we made the arrangements for the wedding, which was to be August eighteenth. She became well acquainted with my sister, Helen, and they spent a lot of time together. One rather odd incident took place. I had been working the last part of the summer on the ranch, and I was quite badly sunburned, and unfortunately, one of my teeth had come out. I didn't look like too good a specimen, and I think my whiskers were a little bit long. My folks had taken the car away the day Ruth was to get on the train to go back to Grand Junction. So there was nothing to do but hitch up the team to the old buggy and take Ruth down the road. And on the way, we met one of her old boyfriends. And she was sort of ashamed of me with my tooth out,

and having to ride in an old-time buggy to get on the train.

Finally it came time for the big event, but my dad took a look at that old Chevrolet and said, "You're not goin' to take any girl back to Nevada in that thing!" So I arranged with Cecil (it was okay by him) to get what we could on a trade-in on the car. I traded the old 1923 Chevrolet in on a 1926 Chevrolet Coach, which looked something like a square pillbox up on four wheels. It was all glassed in, and that was the last word in Chevys at that particular time. I split what we got for the old Chevy with Cecil.

So Cecil and I drove down to Grand Junction, where I prepared to become a bridegroom, and Cecil, my best man. Ruth and I were married in the Fairley's home at 555 Teller Avenue in Grand Junction, August eighteenth. I had hidden that car so that no one could find it and decorate it. However, when we did get it out, Mr. Fairley and some of his pals had more tin cans on it than I thought could possibly be tied to a car. I know, as we were leaving, I had to stop three different times to get all the tin cans off. We didn't get very far that first day. We got as far as Mack, Colorado. The following day, we drove over the old trail which is now part of U.S. 50 to—I believe we made Price. We could not drive very fast. When you bought a car in those days, you were supposed to run it not over twenty-five miles the first five hundred, and not over thirty miles for the next five hundred. In other words, the first thousand miles, you took very good care of the car. We finally made Salt Lake City, where we spent a three-day honeymoon, which just about exhausted what little supply of money I had, and part of what Ruth had.

We drove from Salt Lake City across the Wendover flats. And here again were

many, many roads—take your choice or make a new one—and dust, and dirt, and grime, and salt. It was salt flats. We made Wells that next day, and the following day, I believe we made Lovelock. Cecil was already there, and we stayed in Lovelock overnight. Between Winnemucca and Lovelock that day, there was no sign of any habitation. We amused ourselves by counting the jackrabbits, which were coming out just about sunset. I've forgotten the count, but I think it was up around a hundred. They seemed to be plentiful.

The following day, we left Lovelock, and a good portion of the road between Lovelock and Wadsworth had been graded and graveled. However, without anything to bind the gravel, there were corrugations. Those corrugations were at least six inches high and about eighteen inches to two feet across. And going at twenty-five miles an hour, it was a continual jounce. If you went slower, the jounces were still there, but the amplitude of your vibrations weren't quite as bad. That was one of the most miserable rides that I have ever had!

The road did not go through Fernley, but rather, through Wadsworth. The sand area just out of Wadsworth was the first area I had seen where road oil had been used. Someone thought up the idea that some of these fuel oils might be good for solidifying sand. And sure enough, there was an area there perhaps a half mile long where fuel oil had been applied, and the sand was quite stable. This was, of course, before I had joined the Highway Department, but I believe it was one of the first places where common road oil, as it was called, or fuel oil, in those days, was used to stabilize the roadbed.

We arrived in Carson City and spent our first day or two at the old Arlington Hotel. We found a place to rent, finally. It was a little

cottage up on Phillips Street between the two railroad tracks. The freight spur was on the south side, on Caroline Street, and the main V & T line was on Washington Street to the west of us. The house was owned by a widow woman by the name of Helen Gies. This was a little four-room cottage. It had a rather nice living room, a fairly large bedroom, a fairly large kitchen, a bath and washroom, and a very small room which we later used as a spare bedroom. The yard was huge. It was about a hundred and eighty feet long by about ninety feet wide. It was pretty much overgrown by old stumps. One of the former tenants or owners had raised trees for firewood and cut them down and left the stumps. The brush was growing up from those stumps, and it was rather a ratty-looking mess at the time we moved in.

However, it was in the artesian belt, having been above the fault scarp, and there was an artesian well in our yard, and also another one in the yard of Mrs. Gies. The water out of the artesian well was very palatable and cold. We sometime[s] used that for drinking in spite of the fact that we had good city water.

A good friend of mine, Edgar Norton, who was one of the boarders at the Schulz place, had married a young Carson lady by the name of Margaret Spradling. Ruth and I got acquainted early with the Nortons. In the meantime, Earl Fordham, another pal of mine, had married a girl of Irish descent, although her name sounded like Hawaiian. Her name was Louise Kililea. And Earl and his wife, and Edgar and his wife used to play cards with us (we got together quite a lot), and the Fordhams and the Littles did considerable hiking.

Carson City had some nice customs. The town was small, twelve hundred people, and there was, you might say, quite a lot of people who thought they were really society people.

Nevertheless, these women were friendly. I cannot count the number of calls made on Ruth when we were first married. But they usually came in twos, and sometimes, fours. The custom at that time, when you called—maybe it is still a custom; I'm not very good on that kind of thing—was to leave one card for each woman with her own name on it, and two for her husband. The reason for the two for the husband seemed to be [that] one of the husband's cards was for the lady of the house in his absence, and the other was a courtesy card for the husband in the absence of the husband. I don't know whether this custom is nationwide or not. But it was the first time I ran across it.

We became very [good friends] with the Priests, and we were at the Priests' home many times. We also became very friendly with Reverend and Mrs. [J. L.] Harvey and their family, and we enjoyed the social life of Carson City pretty much together.

Ruth found time on her hands, so in February—I'll go back; I think it was earlier than that. It must've been about October. She started a little kindergarten, private kindergarten, in the house, and she kept that going until about February. And at that time, she went out to Stewart and substituted in kindergarten in the absence of a teacher. She substituted again at Stewart in the fall of '27, during the month of September, until the regular teacher arrived. Ruth also had charge of the Girl Reserves at that time.

My continuation in the community affairs as a husband without his wife along was limited to the Carson City band and the tennis club.

The high school staff at this time consisted of Charles Priest, of course, superintendent and principal; Walter Vaughn, the coach who had charge of mechanical drawing and physical education, too (he had replaced Leslie

Dunnells, who had gone to another job); and Edith Wooldridge [Fritsch] who, I think, had taught before in Carson, but had come from Fallon. Edith Wooldridge took care of the commercial area, typing and shorthand, and also taught Spanish. And Florence Bray still had the English department. And a girl who was a graduate of, I believe, the University of Washington (her name was Lora Harvey) taught Latin, history and economics. A young lady by the name of Frances Wright, a University of Nevada graduate, had the home economics and girls' physical education. I was made vice-principal at this time, and, in addition, I still had the science and math and orchestra.

Near the end of my first teaching year in Carson City, I had talked quite a bit to some of the boys about my experiences, and I thought it would be good for them to get out of Nevada for a while and try their luck at some other school. It so happened that four took me up on that and decided to go back to Western State College, where I had been. These four boys were George Meyers, Harry Sweetland, Royal Crowell, and Lester Taggs. They all went back to Western State College in the fall of 1925, and I got some pretty severe repercussions from that because I think the University of Nevada, and particularly President Clark, thought that Nevada boys should go to Nevada schools. Nevertheless, they did go there.

George Meyers, I believe, stayed longer than any of the rest of them. He was always interested in music, and we had a marvelous music department at Western State College. George played in the band, and I think he and some more boys finally formed an orchestra of their own, and he left Colorado, and he played [with] a dance orchestra. George and his orchestra played over in San Francisco down near the beach, I believe in a place called

"Topsy's Roost." Later, of course, George had to come back when his father, Art Meyers, became quite ill and George had to take over the business.

Then there was Lester Taggs, who spent only one year there, and I believe Royal Crowell also spent only one year. Lester Taggs came back (that was the only year he went to college at all), and he went up into Loyalton, and the last I heard of him, he was in the lumber business. Harry Sweetland got homesick in the middle of the year and came back, and I don't believe he went to another college. Royal Crowell, after finishing his first year, went on up to University of Washington, I believe, where his father had been, and completed his course in pharmacy. Royal, of course, has been a druggist in the pharmacy at Gardnerville for many years.

Upon bringing my bride, Ruth, to Nevada, about one of the very first events which took place was the Eagles' picnic and excursion across Lake Tahoe on the steamer called Tahoe. In those days, I believe there were two steamers, one called the Nevada and the other the Tahoe. The Tahoe was the larger of the two. This happened, as I recall, quite early in September, and even in those days of Prohibition, the Eagles managed to have liquid refreshments, some of them somewhat intoxicating, no doubt. The band, of course, was invited, and their wives went along. We played quite a few numbers on our way over, crossed the lake, and when we arrived at the Tavern, the band assembled on the Tavern lawn and gave a concert. We returned late that afternoon. I think I got a lot of enjoyment out of watching my bride, Ruth, who had never seen anyone drunk [laughing]. And there were several of the boys on board who were fairly well inebriated. I recall one who threw his straw hat at the sea gulls.

This was one event which happened early in the fall. Now, soon after that, I believe it was later in September, there came the big Clear Creek fire [September, 1926]. There had been an earlier fire due west of Carson City, which, I was told, took place sometime in July of that summer. Quite an area was burned west of town. The Clear Creek fire started at a point about where the present Job Corps is built. And it raged, with the wind to carry it. It was a very severe fire. As a matter of fact, four men lost their lives, I believe not so much from burns as from asphyxiation by the smoke. They were lost in a gully up on the old Osterman grade, in the area called "The Barrels," where water was available. But apparently, the fire swept around them and surrounded them, and they couldn't get out of it.

I'd forgotten just how many days this fire lasted, but I believe that it was principally one day only. School was let out, I believe, about eleven o'clock in the morning or perhaps around noon. I was given quite a squad of high school boys; I believe it was all of the older boys, and I was assigned "C" hill, which is due west of Carson City, to put out the brush fires which were already burning on "C" hill.

This I did. I hurried home and got into my old clothes, and we were all supplied mostly with shovels, but I believe there were some wet sacks furnished, also. And while I did not see the main part of the fire through the timber to the west and southwest, we did manage to put out all the brush fires on "C" hill, so it never got down as far as Carson City. This was quite a task, and everybody was extremely tired along toward evening.

There was a lot of ash and cinders flying through the air, and these were landing in Carson City. Fortunately, they were cold. They must've been cold because, as far as I can remember, there was nothing in Carson City

itself that caught fire. However, up on King's Canyon Road there was at least one residence, perhaps two or more, which did catch fire and burn to the ground.

I came home tired that evening. Here sat my bride, Ruth, out in the new Chevy, with all of the wedding presents in the car. Alongside her was Mrs. Gies, our landlady, with her Polly parrot in the cage, and with all her prize belongings wrapped up in a blanket. They were all ready to leave Carson if the town caught fire. I managed to convince them that there was really no danger now that most of the fire was out. So we finally unloaded the belongings and put them back into the houses.

I believe I've already stated what took place during the school year of 1926-27. In the summer of 1927, we drove back to Gunnison. I fully intended to secure enough educational courses and write a thesis to attain a master's degree. As things turned out, as I'll state later, I was never able to finish my master's degree. However, in the summer of 1927, we went back through the middle of the state on what is now U.S. 50, and I stopped with Ruth at Lehman Caves so she would have a chance to visit that particular place. We went on through Grand Junction, stopping awhile to visit with her folks. Mr. Fairly was with the Colorado Fruit Growers Association. Grand Junction at that time was noted for its fine pears, peaches, apples, and other fruits. He worked for this company for some years.

We picked up Ruth's sister, Moss, and took her up to Gunnison with us. Moss was quite a musician, and she had wanted to continue with organ lessons. Western State College had a very fine teacher of the pipe organ, so she stayed with us during the summer. While I was taking my subjects, Moss took piano lessons. Ruth did the cooking. She was, of course, pregnant at the time with our first youngster. Moss was probably about

nineteen at the time. She was a beautiful blonde girl, with sort of reddish hair, and she was very good on the piano and organ. I don't remember just how we got her back to Grand Junction, but I believe she attended only part of the school years. Perhaps she took the train back.

My courses at the time, as nearly as I can remember, was more on statistics, sociology, and school administration. I thought that the best thing for me to do as long as I was in the educational line, was to try to get into the administrative area, where I could make more money. I was already vice principal of the Carson schools, but I had not had much chance to use my professional training in that area.

In addition to attending summer school, being an avid fly fisherman, I spent every spare moment I could on the Gunnison River. I used to catch some mighty fine rainbows and brown trout and eastern brook trout. I also played in the Gunnison band, as usual, but the Gunnison country had one bad feature in the summer, and that was the mosquitoes. The mosquitoes were very thick. Gunnison people, the county people, sometimes tried to put on some kind of an abatement program by pouring oil on the water to kill the larvae. This didn't always do a good job. There's nothing more disconcerting than to have a solo part, with both hands on the horn, and a mosquito feeding on the end of your nose [laughing].

It so happened this was my last chance to secure any formal education. I had enough credits, graduate credits, for a master's degree with the exception of the thesis. And my plan at the time was the following year, to come back and finish up the thesis. As I've said before, because of circumstances, that could not be. We returned to Carson City via the central part of the state again, and I can't recall how many days it took us; [it] usually

took about three days and two nights staying over. After leaving Grand Junction, we stayed overnight in one town in Utah, and the second night, I think we got clear through Utah and over into Nevada, and probably stayed at Eureka, but I'm not sure.

Around noon that particular day, we stopped off at Eastgate. There was one little building there, perhaps two, and the people did serve lunches. I can well remember the lunch. It was sandwiches and cottage cheese. I simply could not stand the cottage cheese, the reason being that during that summer, Ruth and I had visited our folks on Quartz Creek and had gone on up to visit some of my old friends, the Frank Dice family. Frank Dice raised goats and chickens, and he milked cows, and he peddled goat meat, eggs, cottage cheese, chickens, and so forth. While we were there, I noticed pans of milk set out in the sun, souring, clabbering, to make the cheese. And the old red hens, Rhode Island red, I think, they would come up and take—"cluck, cluck, cluck," and then take chop, chop, chop [pounding the table to imitate the sound of the pan], digging their bills right into that cheese. That unsanitary condition stuck in my craw so that I could hardly eat cottage cheese any time since. Boy!

One event in September of 1927 was of special interest and importance. Charles Lindbergh made a visit to Nevada, and, as I recall, school was let out for a half-day. Lindbergh made a short address at Idlewild Park, and I recall what a time we had getting out of Idlewild. That was about the biggest traffic jam for that day and age I have ever seen. I can't remember too much about Lindbergh's speech, but it was something to see the man and to hear him.

Upon our return to Carson City in 1927, we found the house we had lived in the year before was rented, and there was

no indication that the tenants were about to leave; however, we were given the promise of a house owned by Bert Lindsay in the south part of town. However, we were unable to get the house until October first. Our friends, Edgar and Margaret Norton, took pity on us, and we stayed with Edgar and Margaret until the Lindsay house was vacated. Ruth and Margaret were both carrying their first-born, and I believe Patricia Norton was born at the end of September, just before we moved into the Lindsay house. We shared expenses with the Nortons.

Our next door neighbors in the Lindsay house were Aunt Fan Blackie, who was a pioneer (in fact, I think she was one who had come across the plains in a covered wagon), and she was on the south of us. On the north of us was Mr. and Mrs. Damon Carr. Mr. Carr ran the drugstore across the street from the post office.

There was another area about six hundred feet from us that was sort of notorious, were houses Number Two, Three, and Four, as I recall; that was where the girls of ill repute had their quarters. It did not bother anybody in particular. They never bothered us. I believe the only problem that was anything like a problem was in the summertime, when they left their doors and windows open and the player piano could be heard at two o'clock in the morning. Other than that, no one was bothered that I know of. Everybody knew where they were and took it as a matter of course. This, of course, was very strange and seemingly out of the ordinary to my bride, Ruth. Nevertheless, she became accustomed to it.

Leaving the family affairs for a while, I shall continue with some of the routines of school. Again, I had five classes. Physics classes were held on the school year starting with the even numbered years, and chemistry

on school years starting with the odd number. This year I had one of the largest chemistry classes I'd ever had in high school. My Algebra I classes usually [had] from about twenty to thirty students; and Algebra II, usually around fifteen; geometry, twenty to twenty-five; and general science was always a big class, usually always thirty-five; and chemistry and physics varied from about fifteen to twenty-five or -six. Chemistry classes were always larger than the physics classes. Girls seemed to avoid the physics classes, but perhaps I had a reputation of being slightly tough.

I applied the things I had learned in education, particularly the use of statistical methods and the use of objective testing. Many of my tests were essay-type because I believe in essay-type test. Particularly, it aids the student in expressing himself. And I believe by actually practicing the use of English, he learns—or, the writing of it, he learns more about it. I was sort of a stickler on English, and I usually corrected for English as well as for content. This was more than I should have been doing, but I thought it was well to do it.

I compared, when I had the chance, my objective tests with standard tests when they could be obtained. But in that early day, there were not very many. I believe I pioneered in the objective testing part of the thing in the Carson schools. However, the other teachers may have done some of it, but I don't believe the superintendent and the teachers were as familiar with this as I was.

The pay scales, as far as I was concerned, were not too good. The first two years, I taught for sixteen hundred dollars. I was single then, and probably didn't need the money so badly; however, I did have car debts to pay. In 1926-27, I made nineteen hundred dollars and was made vice principal. [In] '27-28, it was raised to two thousand dollars, and [in] '28-29, to

twenty-one hundred dollars. I believe the superintendent, who was also the principal (in tact, all the grades and the high school were in the one building), I believe he obtained as much as around thirty-six hundred dollars. There was quite a disparity between his salary and mine, a question which I presented at the end of the school year 1929, and I did not get very far with it.

Carson High School did not publish an annual every year. They did publish a yearbook every other year. I have one in my possession still, and I think it's the only one I have. It was the yearbook published in 1928. In that publication, a junior girl, Dorothy Hersey, wrote a very fine poem called "Gem of the Sierras." That particular year, the yearbook was dedicated to Lake Tahoe, with a picture in the front. This is Dorothy's poem:

Lake Tahoe, calm and peace art thine,
Where crowning mountains do enshrine
A precious jewel of sapphire blue,
Whereon the sun strikes every hue.
At sunset, when the air grows chilled,
At even, when the birds are stilled,
Your beauty stirs within my breast
A song, a prayer, a peaceful rest.

Because of the biennial nature of the yearbook, both juniors and seniors had their pictures in individually, and statements about their school activities. The sophomores and freshman pictures were simply group pictures. Of course, the other high school activities, such as the athletic activities, drama, and so forth, were pictured.

My science club was one of the clubs with the largest members. I think I had usually around fifty or more people in the science club. They seemed to enjoy coming to those sessions. Different students would present little papers or tell about experiments, and

occasionally, we might have someone from the outside give a talk.

I became quite attached to the class of 1929, probably because I was their class advisor for all four of the years. I was also class advisor for the class of 1928 when they were freshmen. The class of 1928 had twenty members. Some of those I shall mention. John D. Winters was one. John came from a pioneer family; the Winters family, I think got their start out in Washoe Valley. His ranch out there was known by the Winters ranch. His father, Ira Winters, had a ranch, dairy ranch, I believe, just immediately west of Carson City.

And there was Calvin Dodson, who later went through the University of Nevada and is now, the city engineer of Sparks; and Victor Clyde, whom, I believe, went to work in the Highway Department very shortly after leaving high school. He may have had some college work. Victor Clyde just received a forty-year pin, having been in the Highway Department that long. He is at present head of the maintenance department in the state Highway Department.

Then there was Wilson Russell, "Swede," as we called him, who had done quite a lot of banking in his time, and finally became the deputy state director of Selective Service. Swede has just retired with a colonel's rating.

And there was Melvin Fodrin, who had some academic work and served in the Navy in World War II, and is head of the secondary road design division in the state Highway Department. I believe Mel has about enough years in to retire at the present time.

I became very fond of my class that graduated in 1929. I kind of thought of them as my high school family. I'm going to read the names of this graduating class. I have them alphabetically. There was Helen Barney, John Brooks, Jeanne Bonafous, Francis Bradley, Maxine Bondetti, Serena Cook, John Curran,

Gordon Dexter, Grace Donahue, Rose Fodrin, Clara Fothergill, Marjorie Fothergill, Marie Graham, Leona Gordon, Dorothy Hersey, Doris Johnson, Katherine Kendall, Jack Meder, Jack Myles, Marjorie Myles, Elwood Rose, Joe Stern, Mary Trudelle, Alice Uhart, and Joe Wickendey.

Going over these names, I can recall something about the activities of part of these students. Helen Barney lives in Dayton. She married Chester Barton. John Brooks, I believe, passed away just a few years ago, but he was in engineering for quite a few years. Jeanne Bonafous is a widow. I've forgotten her married name. Francis Bradley works in some official capacity in Washington, D. C. His sister, by the way, who graduated later, for quite a time was a writer for the National Geographic. There was Maxine Bondetti, who became a schoolteacher; Serena Cook, an orphan's home girl (I can't remember just what has happened to Serena). There was John Curran, who was in engineering for many years, and he's also noted as an artist. I believe he has pen and ink drawings, and perhaps does work in charcoal and other kind of work. I am not too familiar with his work. There was Gordon Dexter, an Indian boy; I don't remember what happened to him. Grace Donahue, I can't remember much about Grace. There was Rose Fodrin, who was married and lived in Carson for many years, but she was killed in an auto accident just a few years ago. And there was Clara Fothergill and Marjorie Fothergill, both married Carson boys. Marjorie married Frank Berger. Marie Graham, who I believe passed away several years ago, she was married at the time. There's Leona Gordon, who still lives in Carson City. Then there was Dorothy Hersey, who taught school for quite a while and is now retired, living in Carson City; Doris Johnson, who works at Glenbrook,

Nevada. Doris is married. Katherine Kendall, the daughter of the Mr. [J. B.] Kendall, who was in charge of the orphan's home (I can't recall what happened to Katherine). And there's Jack Meder, who took over his father's business in Carson City, and who now operates Meder's Cottages up at Lake Tahoe. His son, John Meder, lives in Carson City and runs the Carson Ice and Fuel. Then there was Jack Myles, who graduated at the University of Nevada, also Marjorie Myles, who also graduated at the University of Nevada. Jack passed away some time ago. Marjorie Myles married Earl Fordham, and I believe they had three children, and I'm quite sure all three are graduates of the University of Nevada, and at the present time are married. And Marjorie told me in a phone conversation just the other day that she is now a grandmother. I believe her son has a child. And there was Elwood Rose, sometimes called "Shorty." He was a very tall boy. He was also called "Suitcase" at one time. Elwood was a big boy, and he had pretty large feet. And there used to be a comic called "Suitcase Sam, the Traveling Man," who had large feet. So a lot of the boys called Elwood "Suitcase" for many years. Elwood is in Reno. I believe he was with some engineering firm, but I'm not sure what he does. And then there was Joe Stern, the son of Joe, Sr., the sheriff. Joe completed a pharmacy course. I don't know just where he did it, but he ran the Riverside Pharmacy for quite a few years in Reno. And there's Mary Trudelle, a graduate of the University of Nevada who taught school for some time, and I believe she is living in Smith Valley. Alice Uhart—I cannot remember just what happened to Alice. And there was Joe Wickenden. And I'm not just sure what happened to Joe.

One of my best friends in my teaching days was Dan Quill, who was the janitor at the school. Dan had two children, I believe.

Jeanne went to school to me. I believe she graduated about 1926, probably. Dan's boy, [Laurence L.], was one of the discoverers of the element illinium [promethium]. He was a Ph.D. and taught chemistry at the University of Illinois. And I'm quite sure that he was largely responsible for the discovery of the element illinium.

In turning to some of the family happenings, 1928, Moss Helen, our first daughter, was born January twentieth of that year. She was born in what was called the Reno Hospital in those days, which was up near the University, south of the University. Dr. Dart Hood attended. Just before Moss Helen was born, Mrs. Fairley, Ruth's mother, came out from Grand Junction and stayed about two weeks.

I can remember that January very well. In traveling back and forth to Reno, the pussywillows were out in Washoe Valley, and that was about the earliest I'd ever seen the pussywillows come out.

Ruth's mother stayed about two weeks at that time, then planned to visit her brother in southern California. I had Ruth home, I believe, in about ten days, and I can remember my first night with the baby in the house. I was up two or three times to make sure that she wasn't being smothered. But after a few days, I got accustomed to having her.

When I went with Mrs. Fairley to put her on the V & T, my mother and my sister, Helen, got off the V & T for a short visit. So I put my in-law on the train and gathered up Ruth's in-laws for a short visit. My mother and sister had been in the Los Angeles area visiting my uncle. The V & T was running pretty much full blast those days. I believe there were at least two trains a day.

I recall later on, Mrs. Fairley returned from Los Angeles, I believe it was late in March, and

she stayed a few days. And it was in April when I took her back to the V & T, and I remember there was eight inches of snow on the ground at that time.

Early that spring, Charles Priest became very ill with pneumonia. I believe he was confined to his home for as long as six weeks, perhaps longer. I took over his duties, at least, as many of them as I could and still teach five classes. And when he was able to do so, 12 would report to him—that is, when he was able to understand what was going on, I would report to him what had taken place in school. He was back on his feet eventually, and again took over the thing. But I believe I had the full responsibility for as much as six or seven weeks.

Charles was not much of a hand to supervise. He did come into my classes a few times, but it was usually to tell me about some meeting or something of the kind, but he very seldom observed my teaching. As a matter of fact, I had very little supervision of any kind from anyone in the five years that I taught in Carson City.

Near the end of the school year—perhaps it was right about the end of the school year, Ruth began to lose weight and was not feeling her best. We took a trip with the Nortons down to Angels Camp, California. She became very ill there, and I brought her home at once and took her to the doctor. Her pulse was extremely high, and [the] doctor explained that her metabolism was extra high, and it looked to him like she had what is called exophthalmic goiter. That is, it's not the kind which enlarges, but rather, is caused by an overactive thyroid. And he said there's two ways that can be overcome: one, by operating, but that is not always successful, and it's quite dangerous at times; and the other is just an absolute rest cure.

We decided on the latter course, and I placed Ruth in a convalescent home run by

Mr. and Mrs. Rubke. The Rubke convalescent home was located just north of Carson City at that time. My finances soon ran out, so I could no longer keep Ruth in the convalescent home, so arrangements were made that she should go back to Colorado and get complete rest in Grand Junction with her folks, the Fairleys. I put Ruth on the V & T train along with Moss Helen, and sent her back East. During the summer of 1928 I took on a summer job in the lab of the state Highway Department.

I was a bachelor, of course (theoretically) during the summer of 1928. I got most of my own meals. Once in a while the neighbors would invite me over or bring over a dish. Aunt Fan Blackie was good about that, so was Gertie Carr, and so was Mrs. John Sanger, Lillian Sanger, who lived across the street. For recreation, I occasionally went fishing. But that usually had to be on Sunday. I still went to church once in a while in those days, but [it was] a little tough tryin' to get along. I did make enough money to sort of get by and pay the rent, and sent a little back to Grand Junction for Ruth.

Ruth could not return at the time school started. The doctor ordered her to stay, and stay quietly in Grand Junction, and be as quiet as she could for another couple of months. So when school started, I had the added job of doing my schoolwork and "baching."

Because I needed the money so badly, I arranged with the state Highway Department to do extra work on Saturdays and on holidays all through the fall, winter, and spring of 1928-29, and I got the same pay, five dollars a day. So all of my Saturdays and some of the holidays were spent continuing down at the Highway Department. In talking matters over with Frank Morrison and with Mr. Durkee, who was Highway engineer at that time, and

Mr. Milton Holcomb, it was decided a chem lab should be provided. Mr. W. E. Wallace (we called him "Blackie" Wallace) was across the basement hall in charge of the stockroom. So Blackie was caused to sacrifice about eighteen feet of length of his storeroom in order to build a new laboratory. So I spent much of my time on Saturdays and on my holidays helping Byrd Lindsay build the chain lab. I did a lot of the plumbing and some of the wiring and the painting, and I helped Byrd and showed him how the lab should be built.

As soon as it was built, we moved some of the oil testing materials out there and purchased and actually manufactured some other apparatus which we had never had before. One such apparatus which we made was an apparatus for heating the road oils so that they would evaporate the volatile materials and obtain a hard material which was hard enough to get the consistency by a standard needle, in an instrument called a penetrometer.

By the end of the year, I knew pretty well about the functions of the Highway laboratory, and apparently, my work had been satisfactory. At the time I was wondering how I could ever finish my master's degree because I really was down and out, as far as finances were concerned. Near the end of the school year 1929, I approached Mr. Priest about obtaining a better salary, since I was vice principal and had been responsible, and I'd responsibly taken care of the job when he was ill. But Mr. Priest didn't seem to be amenable to the idea, so I told him at the next school board meeting, I would appear before the board, which I did, and again, Mr. Priest did not recommend the raise for me, and the board more or less went along with him. So I turned in my resignation and immediately went back to work in the state Highway Department for the same salary I had been

getting at teaching. That ended my teaching career, and I never had the opportunity—as a matter of tact, later, I was not interested so much in the educational matters. However, I did miss the master's degree by a simple thesis, which, had I gone back to summer school, I probably could've finished in a short time because I had most of the information needed from my tests and measurements that I could have written up a thesis, I'm pretty sure, based on the statistical measurements of tests that I had done.

Some of the events in 1928-29 [that] had happened in school and at home are of some significance. First, it was my last school year, and as I recall, the algebra classes were so large that they had to be divided. And as a matter of fact, I believe, for some reason, I had extra duties given me (I believe, the study hall) so that Algebra I was finally taken over entirely by two other teachers. I believe one's name was Miss [Della May] Grubb, and the coach, Mr. [Carl E.] Lawrence. Neither one of those two people were really qualified to teach algebra, and the way it turned out, I might as well have been teaching it anyway, because Miss Grubb, in particular, was in my room after school using about half an hour every evening trying to get ready for the next day's lesson.

But that year was the year my "children," as I called them, graduated. They had a senior play in the latter part of the year (I think it was about May) titled, *Who Wouldn't be Crazy?* Titters was a little trouble there, because unlike many students, most of mine wanted to be the top performer in everything. So there was quite a little problem there. I had Mr. [Roscoe N.] McGuire, a townsman here, who was quite experienced in coaching plays, take over as a coach. But because he was in business, he refused to choose the characters even after tryout. That was my responsibility, and it was a rough one on me because I'm

afraid some of my "children," as I called them, were not so friendly after that. But I did the best I could in choosing the characters.

Our high school orchestra functioned all year, as usual. And, of course, we played for all school doings of that kind, and my part in the play was principally to direct the orchestra whenever the time came. Some of the chief characters in the play had also to come and play in the orchestra between acts.

The senior cut day was held during the latter part of May. It was the custom of senior cut day for all seniors to have the day off during the school day, and a class advisor usually accompanies them on their excursion. They had chosen the Brockway beach to have their picnic and party. That meant traveling over state Route 28, which was in rather poor condition. All the roads in those days (outside of the Reno-Carson highway) were unpaved. And Route 28, from Spooners Summit on down to Brockway, was narrow, and the grades were rather steep, and the road was rough. One of the vehicles used belonged to Frank Berger. Frank Berger had graduated a year or two before, but his girlfriend was Marjorie Fothergill. Therefore, Frank loaned his car to Marjorie, and a boy by the name of Nick Ures, who was a junior, was allowed to go on senior cut day because he was entrusted by Berger with his car. This particular car had as passengers, besides Nick and Marjorie Fothergill, Maxine Bondetti, I believe, and there may have been another. In any event, on the way down Route 28, something happened that Nick lost control, and he went over the bank head-first, but had presence of mind to point the car toward a big tree. It hit the tree without tipping over, but I believe Marjorie [Fothergill] was severely hurt, and I don't remember about Nick, but I believe

Maxine was also hurt. This rather spoiled the day because the people who were hurt had to be taken back to Carson City. But the rest of the picnic finally went on, and we got through that day after a fashion, but the joy was taken out of it by all concerned on account of this accident.

Then, after school was out, there was still a problem remaining about Berger's car, who would pay for the damages. After I was all through with the teaching, we had a meeting with the students after school was out—that is, the senior students—and we decided we would give a dance and raise the money. So we did. We gave a public dance and sold favors and raised enough money at that dance to pay for reconditioning Berger's car. So the class of 1929 got through the thing without owing anybody for anything.

A good many of my students during the time I was teaching had problems with math. And if they were willing to do so, I was willing to give them extra time, which I did many, many times. I can recall when I was teaching Algebra I in my second and third years, there were some students who were anxious to pass, but just didn't seem to have the capacity to learn math. But by extra hard work after school, sometimes as much as two or three times a week, they finally made what I called passing grades. It was not necessary that I do this, but I thought I should do it. If the students were willing, I was always willing to help.

I must say a word about personal and family things which occurred during the year 1929. My wife, Ruth, had recovered quite fully by about the first of November in this rest cure treatment for her goiter condition. And she returned to Carson City with our baby, Moss Helen, by train. Although she had to be quite careful for several months, she seemed to improve considerably.

Along in the winter, my sister came out from Colorado. She had not been able to finish high school on account of an illness she had had, and was sort of tired, just "existing," as she called it, on the ranch. So we got her some employment with Miss Clara Crisler, who at that time was head of one of the federal jobs. I believe it had something to do with government land. So Helen came at that time and stayed on through the summer. I believe it was during that summer of 1929 that she obtained employment at Stewart as cook for the club—that is, the club operated by the teachers. Later on, she went from that job to one of the girls' matrons jobs. But Helen and I were alone here, so to speak, during the summer of 1929 because Ruth and Moss Helen rode back to Colorado with Damon and Gertie Carr, our neighbors, and stayed there most of the summer. Helen was as good or better a fisherman than I was, so, sometimes on the weekends, we would go fishing. I don't remember just when Ruth returned, but I believe it was about the time that school started in the fall, and she returned by train. Of course, in the meantime, I had become steadily employed at the state Highway Department laboratory.

EARLY YEARS IN THE HIGHWAY DEPARTMENT

Due to my financial situation [in the summer of 1928 with finances depleted by Ruth Little's stay at the Rubke Convalescent Home], I went down to the Highway Department (I've forgotten who I saw now; probably it was Billy Holcomb and [Huston] Mills, two of the men I knew) and managed to obtain a summertime job in the laboratory. I had majored in chemistry and actually was a qualified chemist. So I was introduced to Frank Morrison, who was testing engineer at the time, and to Bill Robohm, his only helper. So I was made a third man in the laboratory.

The laboratory at that time consisted of one long room in the basement with a small office. There was not much equipment in there. I will tell about equipment and the duties later.

Mr. Morrison, Frank Morrison, was called "Ole" by his acquaintances. I don't think he was of Scandinavian origin. As a matter of fact, I think he told me his father was Scotch and his mother was of Italian descent. As a matter of fact, I met his mother later on out in Washoe Valley. Frank was extremely hard

of hearing (but I was accustomed to that; Charles Priest was also hard of hearing), and I found myself shouting to everybody after working with Charlie Priest, and then with Frank Morrison awhile. Frank was a good-natured man, and he very carefully explained operations to me, such as they were in those days. There was not much equipment to work with. There was no chem lab. Operations I did were some of the physical tests and some of the chemical tests. But we had to improvise a lot because of lack of apparatus.

Bill Robohm was a man who had about fifth or sixth grade education, and he had been a prospector and a miner most of his life. Nevertheless, he would perform laboratory routines exactly like they were supposed to be without varying one thing at any time. You could always depend upon Bill Robohm for results, because you knew he followed the directions explicitly.

Morrison did some of the work, but he was also involved in field work. In those days, there were not very many field supervisors. The resident engineers were pretty much on

their own, and Morrison had to spend quite a lot of his time out in the field.

I believe my pay at the time was five dollars per day. But upon occasion, I worked all day Saturday, as well as the five and a half days. In those days, the Highway Department worked Monday through Friday, and Saturday until noon. Sometimes I continued on through the afternoon [on] Saturdays.

Equipment in the laboratory, for physical tests, consisted of what was called a Deval abrasion machine, whereby the gravels were tested for wearing qualities, [and] a briquette breaker. Briquettes were made with one part of Portland cement and four parts of standard Ottawa sand, and were aged seven and twenty-eight days in a moist cabinet or in water, which presumably was kept at seventy degrees, and broken to get the tensile strength of the cement. That was one of the required tests in those days.

There was also several small pieces of equipment, ordinary tools and forms and molds, for the different specimens made up. There was a test called the *Lineal shrinkage test*, which was sort of an improvised test, yet it served quite well in classifying some of the soil. These lineal shrinkage specimens were ten inches long, one inch wide, and half an inch deep. They were made up with the soils passing a Number 10 sieve, and the soil was moistened to a point called the field moisture equivalent, which was obtained by packing the material down, stirring it and packing, until, when it was repacked and struck with a trowel, a sheen was left on the surface. At that time the lineal shrinkage specimen was made up and dried. And in those days, something which would shrink as much as five percent was called very bad, something that would shrink as much as About three percent was called rather questionable, and two percent was fair. Anything better than two percent

was called satisfactory. This was sort of a makeshift test, but it did serve the purpose for many years.

Then there was an oil extractor. Asphalt had not been used much in the state. In fact, it was just beginning to be used. And in order to determine how much asphalt was in a mix, it was placed in a centrifuge called a Dulin Rotorex, operated electrically, and the sample was placed in a bowl. The bowl was covered with a tight-fitting piece of apparatus, and a filter was in between the top, the cover of the bowl, and the bowl itself. When the mixture in the bowl was surrounded by a solvent, such as carbon tetrachloride or benzol, the asphalt would be at least partly dissolved. It would stand awhile, and then it was centrifuged for a certain time, and the centrifugal force would force the dissolved asphalt and the liquor out through the edge of the filter, which was caught in a large tank and run of f into waste product. Several washings had to be made.

There was one trouble with this machine. It had a tendency to catch fire. And about once a day we'd have a fire in that machine; we usually had the fire extinguisher nearby, and it was no trouble putting it out.

Another test in those days was called the Engler method of determining viscosity. Viscosity is a measure of the liquid material with respect to its consistency, whether it's thin liquid or a thick liquid. And this Engler instrument was surrounded by a water bath, which was heated by a gas burner, manually, of course. And to control the temperature correctly was quite a job because the gas in those days was not the kind of canned gas we have now. As a matter of fact, the Carson Gas Works was still in operation, and with only a quarter-pound pressure, it was difficult to get high temperatures. But I did run some of the viscosities.

Another test, of course, which is an important test, was sieve analysis of the various kinds of gravels, some of the gravels used for base and surfacing courses, and others used for concrete. The coarse material was run through a nest of large sieves, depending on what it is to be used for. The largest sieve might be [a] three-inch, or inch and a half, or one-inch size, and they ran on down to about what is called a Number 4, which is approximately a quarter-inch size. These individual fractions were weighed and computed as a percentage of the total sample. Then the fine material passing that Number 4 sieve—a fraction of that was taken and run into a series of small sieves running from Number 4 down to a Number 200 sieve, which has two hundred openings per linear inch, or forty thousand openings in a square inch. That was the finest sieve used. And that, of course, from that sieve analysis, you could tell the size characteristics of the fines. However, in later years, very few things were screened by simply putting them on the stove and drying them out. They were weighed and then washed, and the washed materials run through a Number 200 sieve, and then the material which was retained on the 200 sieve was run through again. Otherwise, the very fine materials would often cling to the gravel particles and the sand particles would not wash through. The most critical part of a sample used for base and surface usually is the fines passing the Number 200 sieve, as I will explain later on.

Another test that was made in those days was test of samples of corrugated metal pipe. The fabricator furnishing the pipe would send samples representing the heats from which the shipment would be made. And those samples were tested for shelter coating, which was a zinc coating over the steel to protect the steel from rusting. That was usually done in

two ways. One was by the hydrochloric acid method, and another was by using a lead acetate method. Billy Robohm was a little bit frightened by acid, so he usually used the other method, although it took much longer to do it.

There's supposed to be at least two ounces of spelter coating per square foot of pipe. So it was very easy to compute—by simply the loss in weight, compute the loss of weight and knowing the area of the sample, which was done by putting the sample down on paper and drawing a diagram of it. Or, if it were cut by the steel companies, it was usually of such dimensions that it was constant.

And in order to check this, when the pipe would arrive on the job, the resident engineer or one of his assistants would cut triangular pieces from at least one or two out of every size of pipe, but not out of every pipe. And those were sent into the laboratory for confirmatory tests. Usually, if all the original tests passed, the confirmatory tests passed. However, sometimes we found bad pipe which had to be rejected. In those cases, we'd do a lot more testing in order to test the entire shipment.

I did quite a lot of these kinds of tests that I've just mentioned during that summer. Also, it was necessary at times to run a chemical analysts on the base metal—that is, the raw steel, after the spelter coating was removed. This was done by taking a hack saw and preparing steel filings from the samples. And they were run for certain things, like manganese, phosphorus, sulfur, and silica. Those tests are standard tests, some of them quite tedious. The only trouble was, with the laboratory, the way it was equipped, it really wasn't equipped to do it properly. Although there were burettes and the acids and beakers, and so forth, there really wasn't room to do it in a dusty room where a sieve analysis was being prepared.

I also ran chemical analyses on cements. There were several tests done on cement, physical tests, such as making briquettes with standard sand in order to get the strength at seven and twenty-eight days; also getting the fineness, the fineness of grind of cement, by passing it through a 200-mesh sieve; also the time of set, the initial set, and final set; and another test called the normal consistency. I will not go into all of those at this time. Chemical analysis was made occasionally on the cements to see if they complied with the specifications; I did some of these during that summer.

I began my work in the state Highway Department during Sam Durkee's administration. Of course, the first year, I was working as a special workman. Nevertheless, the things I learned during that year and things I observed stood me in good stead, and I lost no time trying to relearn things when I went into the department as a steady employee. I believe I missed very little time between the teaching and the steady work in the Highway Department. It seems to me I went to work almost immediately after school was out.

Now while I actually worked under Durkee's administration, 1928 to 1935, I was very well acquainted with the immediate administration before that time, under Scrugham. Mr. and Mrs. George Borden were very friendly, probably because Borden was on the school board part of the time, and also because Knox Borden, their oldest boy, was in my classes. Knox was an excellent student, and he was very good at helping with things in the science club, and things of that kind. I was not acquainted with the board members under the Scrugham administration, except with the governor himself. Of course, Jimmy Scrugham, the governor's son, was also one of my students.

I believe it was the late spring of 1927 when the new board under Balzar took over. That Highway board consisted of the governor, Fred Balzar; the state controller, E. C. Peterson; and the attorney general, N. A. Diskin. This was a Republican-controlled board, and, of course, the new administration of the Highway Department took over. Durkee had taken over as acting chief when Borden was notified that it was time for him to resign. I believe that took place early in May, and on May 31, 1927, Mr. Durkee was officially the state Highway engineer.

In those days, there was no personnel system as there is now. Even now, of course, the state Highway engineer and his chief deputies are subject to the whims of the political party in control. However, there was some careful thought given to choice of some of the department heads. Regardless of politics, the boards managed to keep in some of the experienced men, particularly in the technical fields.

Some of the other people I was acquainted with in the older administration [were], of course, Mr. and Mrs. Toy. Howard Toy was the assistant state Highway engineer. They were active members of the tennis club; that's where I became acquainted with them. Then there was Bill Holcomb and Huston Mills, both of whom were held over in the new administration. I became acquainted with Mills and Holcomb through the old boardinghouse times at Mrs. Schulz's. Holcomb had been testing engineer, of course, and Mills had been right-of-way engineer. And I was acquainted with Mr. Floyd Booe, who was the chief auditor. And I recall Floyd Booe's treatment of me in San Francisco. I happened to meet him there on one of my first trips to San Francisco. He very kindly took me in his car all through the city. And [Joseph M.] Kane, who was the chief draftsman, was a native

Carsonite, and I was very well acquainted with Joe and the girl he later married, whose name was also Kane. And Park Boneysteele, who at that time was a maintenance engineer, was also an acquaintance of mine. In fact, he lived right across the street from the Schulz's boardinghouse. These people, most of them, were removed. As a matter of fact, I think some of them knew they were going to be removed, and they got out early in the game.

The 1927 board, in addition to Durkee, appointed W. A. Young as assistant state Highway engineer, and Huston Mills was taken from right-of-way and was made office engineer and secretary of the board. Mr. Booe was replaced by Ernie Pohl, B. C.. Pohl, as chief accountant. Holcomb, of course, [had] gone from testing engineer to chief draftsman. And Frank Morrison was appointed as testing engineer, and Dale Pruett was made right-of-way engineer, replacing [the] former right-of-way engineer by the name of Dick Windele. And a new division seemed to be added—or, rather, a new branch, called the equipment division, which was located in Reno. J. P. Rawson was made equipment superintendent. And the bridge engineer was Merle Hardy.

In those days (I'm referring now to 1927-28), there were only four divisions in this state. Division One at Las Vegas was in charge of C. C. Boyer, and Division Two with Reno headquarters, was Art Loforth. Waite Bruce was in charge of the division at Elko, Division Three, and Frank Depp was in charge of Division Four at Ely. The state was divided four ways at that time.

Of course, my work in the Highway Department in the summer of '28 and then Saturdays throughout the winter in my last teaching year, '28 and '29, gave me a pretty fair knowledge of the *modus operandi* of the Highway Department, so that when I

did go in as a steady employee, I knew my way around pretty well. I soon learned about the important part played by the Bureau of Public Roads in the Highway Department. Nevada was a public lands state. I believe at the time the department was formed, the public lands amounted to as much as ninety percent, or perhaps a little more. Later on, I believe it was supposed to be about eighty-seven percent. The Bureau of Public Roads played a very important part in the financing and programming, [and] the design and construction of all state highways because the money the state received for the so-called federal aid program was in the ratio of public lands to private lands. At that time, there was no Nevada division engineer in the bureau. Mr. Sweetser, who might be called a division or region engineer for the Bureau of Public Roads, had his office located in San Francisco. But some of his chief assistants were traveling men who supervised and looked over the work of the states under Mr. Sweetser's supervision. I believe California and Nevada were the two states under his supervision. He may have had Arizona, also. I don't recall at the present time.

Mr. B. C. Brown, an engineer who was very thorough and who was also a very fine man, was the man who Mr. Sweetser depended upon mostly for the work in Nevada. Later on he had an assistant—that is, Mr. Brown had an assistant, by the name of Mr. Applegate. These two men worked together in going over the Nevada plans, specifications, programs, financing, and engineering, including testing.

There was also a bridge engineer who went over the plans and specifications for bridges—that is, a bridge engineer from out of the Bureau. I've forgotten at the moment the name of that man.

By law or directive (probably part of each), the state Highway departments were

divided really into what might be called three general groups, first, the administration, which was composed of a board of directors, the state Highway engineer and his assistant, the office engineer, who acted as secretary of the board, and the chief accountant. Then the departments came next. They included roadway design, bridge design and engineering, testing, the right-of-way, and the equipment superintendent. At one time, the head of the state police was also a part of the Highway Department. But that was not true—at least, I don't believe it was—at the time I was working in the department. Then, of course, there [were] the five divisions in the state, each of those divisions being under a separate engineer, who, in those days, was responsible for maintenance and construction. There had been a maintenance engineer by the name of Mr. Boneysteele, but apparently in 1927-28, all maintenance was left up to the division engineers. Direct supervision [of construction] was mainly handled by them. However, different people from the headquarters department, such as the testing engineer, and perhaps his assistants, the bridge engineer, and sometimes the assistant state Highway engineer, and others, would visit construction and maintenance projects and assist the division engineers, especially when certain peculiar or important problems would arise.

I think it is well that some of the early biennial reports be reviewed. One thing was a very important thing. At first, the mud holes and ruts and bad flats and bad grades were hurriedly graded, and regular crushed gravel or pit-run gravel, whichever could be made to serve, was placed on the roads for the surfacing. One remark had particular significance. That was with corrugation problems. And another remark by Mr. Boneysteele and others (I think in early reports) was the loss of gravel.

It seems that according to Boneysteele, the corrugations were the worst problem, and he had a sketch in one of the [laughing] biennial reports showing his theory of what made corrugations.

There was one report about the loss of gravel. Of course, the gravel, as it was made, was a mixture of rock and sand particles without too much cohesion. So the traffic itself would throw a lot of the gravel entirely off the road. In the 1927-28 report, one remark was made, that approximately three-eighths of the compacted surface of the gravel roads was lost per year just due to traffic alone. That would amount to an equivalent of about a hundred and twenty cubic yards of gravel per mile, which made quite a little cost.

There was also an interesting notation about the replacement of the steam shovels by gasoline shovels. Of course, later, it was diesel rather than gasoline.

The corrugations problem was soon to be solved with the advent of the use of liquid asphalt, called in those days, "road oils." However, that is a long story, but the beginnings were in the middle twenties. There was a little asphalt laid, I believe, back in the middle twenties in the city of Sparks., but there was not much done with the so-called country roads, except, of course, there was Portland cement concrete between Reno and Carson, which was built, I believe, in 1918 through about 1920. Those who remember that road will remember it as a fifteen-foot wide concrete pavement from Carson City to Huffaker's, and from Huffaker's to Reno, it was widened to eighteen feet. For the width and size of the vehicles in those days, there was plenty of room to pass each other on the fifteen-foot strip. This could not very well be done at the present time.

In the 1927-1928 biennial report, Frank Morrison, the testing engineer, showed that

2,030 samples of various highway materials had been tested, as compared to about 1,400 in the biennial report of four years earlier. Asphaltic products accounted for some of the increase, although, as I said before, the asphalt was just coming into use.

During the 1929-1930 biennium, the Highway board and the Highway engineer and assistant were the same as in the '27-28 biennium. There was some change among department heads. George Egan replaced, I believe it was [L. M.] Merle Hardy, as bridge engineer, and one more division was added at Tonopah. Divisions One and Four, I believe, were carved up to some extent, possibly also some of Division Two. And Division Five was made from these sections of those former divisions, and J. C. Rodder was made the division engineer. There was still no maintenance or construction engineer at that time. And the supervision of both maintenance and construction was left pretty much entirely to the division engineers, with occasional help from people from headquarters.

There was one policy developed about 1929 and 1930, which had to do with emphasis on reconstruction rather than new construction. Already, there was a good many miles of gravel roads built, but due to loss of gravel, and due to corrugation, it was decided to reconstruct them using the asphaltic road oil or other asphalt products, whatever could be obtained, to overcome the corrugations and to produce a dust-free, hard-riding surface. The use of these so-called road oils was growing all through the western states. There was no oil produced in the state of Nevada, so Nevada's problem was that it must be brought from the outside. Most of it, of course, came from California at first. Later on, some of it came from the Utah refineries.

There were certain problems in connection with the use of this asphaltic material. The first road oils were called 60-70 fuel oils. A little explanation is needed here. These oils were residues left from the crude after perhaps the gasoline, or in some cases, kerosene, or in some cases, lube oils, were removed from the crudes. This residue was used mainly as fuel in sea-going vessels. However, it made an excellent binder for road materials. The 60-70 is a percentage of what was called the asphalt. Now, asphalt is not a single substance. It's composed of a conglomeration of hydrocarbons, and the amount of asphalt was determined by evaporating off the lighter oils out of the fuel oil and then determining the consistency of the result by means of a penetrating needle. And this 60-70 implied that the oil contained between sixty and seventy percent of asphalt with a penetration of eighty, as determined by the standard needle. This was what was done at first. Later on, specifications were changed, of course, so that instead of using the figure of eighty, the figure of one hundred was used.

Much of this oil was used on the roads which had been graveled and which were reconstructed, the reconstruction being adding more gravel and usually oiling to a theoretical thickness of two and a half or three inches. Real problems in connection with the oiling were, first of all, the shipment. In those days, there were no trucks and trailers hauling big loads because the roads probably wouldn't stand it, and the trailers and trucks, and so forth, had not been invented to the point where they could do the hauling. All delivery was by rail in tank cars. That meant if a road were to be built between Austin and Fallon, for example, the oil would have to be unloaded at a railroad terminal, and then hauled in some kind of a truck conveyance to the point where it was used. The additional

haul added quite a little bit to the cost. That was one of the problems. Another problem was, at first, the presence of water in some of the oils. A certain amount of water was allowed. However, very often, the water caused some frothing and some problems in unloading. Another problem, of course, was application of the oil to the gravel, and mixing so that a uniform mix could be obtained, and still another problem, getting the proper amount of oil.

Mixing usually was done early in the game by discs and harrows and blades. The blades did the best job before road mixing machines were invented. Practically all the asphaltic surfaces were blade-mixed and blade-laid.

According to some of the reports, I believe in 1929-1930, there was said to have been 392 miles oiled or asphalt-treated, and 274 miles of new construction. Now, of 392 miles, all of that was not reconstructed by contract. Some of the oiling was done by maintenance forces. As a matter of fact, quite a lot of it was done by maintenance forces. The state forces were said to have oiled more than two hundred miles.

Another problem which had very great significance, as far as testing was concerned, was to get a representative sample of the oil in the car. Each carload had to be sampled and tested. I was doing quite a lot of this testing in the early days. In fact, I did most of it in 1929 and in some of 1930. And I remember the first samples would come in in such containers as milk bottles, beer bottles, and no one knew for sure just how the sample had been taken. Sometimes they simply took a little of the first oil that came out of the tank. If it came out of the bottom of the tank, there was a chance of getting the bottom sediments and water. I remember one sample that came in that, after it had settled, there was about one-third of it that was water. Of course, this sample was useless and worthless. Actually, there

probably wasn't more than a few tenths of a percent of water in the entire tank load, but apparently, it all settled down to the bottom.

Another problem, of course, was keeping the temperature of the oil up. It had to be applied hot, and the tank cars usually came in quite hot. But on long hauls, there was a chance the oil would cool off if it had to be hauled a hundred miles or so. Insulated truck tanks had to be provided.

Of course, when there was water in the sample, it made testing difficult. Some of the tests were extremely difficult to do with water in the sample. Therefore, if the water was too bad, we didn't bother to test that particular sample. Where it was possible to do so, we would get another sample. But usually, the oil was all on the road before another sample could be taken. As a matter of fact, in most cases, the oil was used before the tests were completed. However, a requirement was made that the companies furnishing the asphalt would submit test reports reporting the tests that they had done in their own laboratories, and these test reports were to be received and okayed before the oil could be used. The tests done by the Highway laboratory were, as a matter of fact, merely confirmatory tests; however, we didn't always agree. But in most cases, the oil was satisfactory and did a good job.

One reason, and good reason, for not waiting for the laboratory test, the Highway Department laboratory test, before the oil was accepted was the demurrage on the cars. If they were left two or three days, say, down in Vegas until the samples could be sent to Carson City and then the tests completed and returned, the demurrage would be out of the question. However, the company's test reports were usually quite reliable. We didn't always agree with them.

Then, too, our sampling procedure had to be modified, and many kinds of sampling

procedures were checked out. But the one which usually was about the best was to sink some kind of a sample container to the bottom of the car, use a device to pull the stopper, and slowly raise it to the top, which would give more or less a cross section. The name given to such a sampler was called an "oil thief." That probably gave us about as good a samples as we could expect. Later on, we made a ruling and found we could get a fairly good idea if the first third of the load was unloaded into transfer trucks before the sample was taken. In that case, a portion of the flow of the middle third could be taken, which was presumed to be representative of the oil. And in most cases, it was.

This matter of oil testing occupied most of my time, as I have stated, early in the game. But I had questions which I could not answer, and I believe the same questions came up to many other laboratory people in the West. We were all trying to find some way to really evaluate these oils. One approach that I made was, what are its adhesive qualities, and how can that be measured?

We purchased a little machine called an adhesiometer. And when I had the time (I presume that was during the winter months), I ran quite a few experiments with this adhesiometer. However, more attention should be given, I found, to the nature of the surfaces. Here was an instrument, made of steel, and we were checking the adhesion of oil to steel. But what we wanted to know was adhesion of oil to the aggregates, or rock, and the sand, and the soil in the aggregate. However, knowing our Nevada geology, most of our gravels were either alluvial or lacustrine; that is, they were formed by water from washing, outwash tram gullies or old, ancient beaches, such as ancient Lake Lahontan and ancient Lake Bonneville, which, of course, was a part of Salt Lake, and

other minor lakes. And those gravels might contain from ten to fifty varieties of rock, some quartz materials of acidic nature, and some basaltic materials of a basic nature. So the surfaces in the material, being so varied, I soon gave up my so-called research with adhesiometer because it was not doing the proper thing.

However, some of the other states found some things which gave help in that respect. Mr. Powers, the chief testing engineer of the state of Arizona, and his staff devised a test called the *water-oil oreferebtuak test*. This test involved placing the gravel to be used, after mixing it with the oil to be used, into a container with water and shaking the thing up and observing the results after shaking it with the water. If the oil seemed to be covering very well, that was fine. If it seemed to have separated and leaving clean particles of rock, that was not good. If it was kind of a haphazard test, it was not a quantitative test; it was more of a qualitative test. Yet, it was better than nothing. At least it did show that usually, the quartz material, the acidic materials, had more tendency to shed the oil in the presence of water than did the basic materials. This, to a chemist, was good sense because the most of the asphaltic oils contain sulfur compounds, and these sulfur compounds, sulfanates, and so forth, usually were of an acidic nature. And as anyone who has taken elementary chemistry knows, like charges repel each other, and unlike charges attract. Thus, the acidic oil sticks more closely to a basic rock than to an acidic rock. In later years, ways were found to use almost any kind of aggregate by adding certain special preparations to the rock.

The report in 1929-1930, the laboratory, is useful in comparing the volume of testing. Of course, there were a few more employees. I believe, however, there were only three—

Frank Morrison, Bill Robohm, and myself—up to that time. My work, in the early years, was confined principally to chemical analysis and to the oil testing. And the total number of samples for the 1929-1930 biennium was 4,345, compared [to] the results for the other biennium [which] were given earlier. Of these, better than four thousand samples, almost eleven thousand, or 10,851, varieties of tests were made. A good portion of these tests, perhaps at least a third of them, were on the asphaltic materials. Detailed kinds of tests and number of samples are shown in the biennial reports. I will not try to repeat all of those here.

During the 1929-1930 period, the roads which were reconstructed—and new construction was pretty much scattered all through the state, but attention was given to the most heavily traveled roads first. While the state Highway Department did the design and construction and testing on most of the roads in the state, the forest roads, as they were called, were the responsibility of the Bureau of Public Roads directly. They actually designed and supervised the construction of the forest roads. During this biennium, grading and drainage was undertaken in the forest road from Spooners Summit in Douglas County to Incline—or possibly to Incline in Washoe County. And William H. Smith was the resident engineer on that for the Bureau of Public Roads. As a matter of fact, all of his samples came to our lab for testing. We did this for the Bureau of Public Roads, and the samples included, of course, gravels and concrete, and a few concrete structures. The gravel, however, was not crushed and screened gravel, but rather was native decomposed granite simply removed from the local hillsides. And it made a very good, travelable surface. Mr. Smith later became the Bureau of Public Roads district engineer of the state of Nevada.

The 1929-1930 biennial report, as the section given by the laboratory showed, that several new pieces of equipment were added. One of the tests for testing asphalts was an evaporation test, and the standard method was to use a single cup, holding a single sample, and heat it to a certain temperature (corrected for elevation, of course). That period of test usually took five hours to run the one sample. California had sort of modified that, to some extent, for a saving of time by using a multiple evaporator. Frank Morrison, testing engineer, decided that would be about the best thing for us to do, so he, with the help of Mr. Rawson's employees at the state equipment yard, devised a twelve-sample bath. Now, this twelve-sample bath consisted of a metal frame with a metal top with twelve holes drilled through the top, each hole capable of holding a three-ounce ointment can. The bulge around where the lid fits on the ointment can was just sufficient to keep the sample from falling into the bath. The bath would contain a 600W oil, or some heavy oil like that, which would not evaporate readily, but which could be heated up to temperatures of, say, perhaps five, six hundred degrees without evaporating.

By use of this device, although it was not standard, twelve samples could be evaporated at one time. That was quite a saving in time, and there were some objections to it, of course, because it actually didn't meet specifications exactly. But many of the states had adopted it, and because of the fact that asphalt is not a pure substance, and there are so many variations, there was really no serious objection to the use of this three-ounce can and multiple rather than the standard six-ounce standard cup.

Another instrument which was used was a four-tube Saybolt viscosimeter. This was purchased new, as I recall, about 1929 or 1930. By using four tubes, the viscosity

of four samples could be run at the same time. The heat was electrically controlled, and the controls fit on the wall, and the bath containing the viscometer tube stood on the table. The viscosity tubes were quite important things. The orifice had the standard dimensions, and it was made of platinum. And the viscosity was the timing of the flow at a certain temperature to collect I believe it was sixty cubic centimeters as measured in a little vial. A stopwatch, of course, was part of the apparatus in determining viscosity.

I think I have stated before that consistency of the asphaltic products was measured in three ways. Viscosity was used for measuring the fluidity of the liquid asphalts. Some asphaltic products, upon evaporation, were tested for consistency by means of what was called a float test. This float test is a little device in which the asphalt was placed. It was made of brass, and was amalgamated with mercury on the inside and placed on an amalgam plate. The asphalt in this little brass cup was screwed into a collar which would float on top of water at a certain temperature in a water bath. Then the flow of viscosity was measured by the time it took [the asphalt to become fluid enough to flow out of the cup] The asphalt in its collar and float were placed in the bath at a certain temperature until the heat of the water melted the asphalt and the water bubbled up in and sank the float. This was what I called a haywire test, and I never was in favor of it. I will discuss it at some length later on.

Of course, the solid asphalts, which were too solid to use in the float test to measure the consistency, were measured by what is called the penetration test. Standard penetrometers were devised, which consisted mainly of a standard needle, made of steel and of certain dimensions, which was placed in the instrument, and the asphalt at the end of the evaporation test, after cooling so many

hours and held to a temperature of seventy-seven, I believe—anyway, to the standard temperature whatever it was, somewhere in the seventies— was placed in water, and this needle placed very carefully with a weight of—I believe it was fifty grams on it, just barely in contact with the asphalt. Finding that point of contact was done by noticing the reflection in the water, and the light had to be just right to get it correctly. Then, by using a stopwatch, or later on, by automatic timers, the needle was allowed, with its weight, to penetrate for five seconds. And at the end of that time, the depth it would penetrate was measured in millimeters. A penetration of one hundred would be one centimeter. It would be almost impossible to get that asphalt to a consistency where you could get exactly a hundred penetration (or one centimeter). So tables had to be made up, through research, to extrapolate or interpolate those that were off; so by taking the average of three or four punches, and using a table, you could convert that— the ratio between the percentage and the penetration to the amount of percentage of asphalt of a hundred penetration (or one centimeter).

So there were three ways determining consistency: penetration tests for the hard asphalts, the semisoft asphalts by the float, and the liquid asphalts by viscosity. Now, a laboratory was provided with a penetrometer and the standard needles. The old penetrometers were nothing to be compared with the ones which were developed in later years. So for our oil testing, as it was known in those days, we were fairly well equipped. Other equipment was added during this biennium. It had been the custom to use the University of Nevada's two testing machines, one, a relay machine of two hundred thousand pounds capacity, for breaking steel and concrete, and another

one of less capacity for getting what was called a compression value of soils which had been made up into molds, cylinders in the cylindrical molds.

It was quite a nuisance at least once, or sometimes twice, or sometimes three times a week, to pick up these samples and take them over to the University to test. Mr. Morrison did most of it, but as time went on, I did part of it, and other people, in later years, did that. However, during this biennium, we purchased a small hand-operated hydraulic testing machine, which could be used for breaking of concrete cylinders. We did not have the money to get a universal testing machine at that time, which would be capable of pulling steel apart, getting the tensile strength, as well [as] getting the compressive strength of concrete cylinders. However, the steel still had to be taken over to the University, which was done until the year of 1936, when the new laboratory was built.

Well, this little machine, which cost about seven hundred dollars at that time, was used, then, to break our concrete cylinders.. Actually, Uncle Sam helped us pay for that machine (he probably more than paid for it) because the Naval Ammunition Depot was under construction in Hawthorne. They sent their concrete cylinders up to us to be tested. We charged them a dollar apiece for capping, storing, and breaking each cylinder. I think we paid for the machine over and again several times by breaking the cylinders at the time the Naval Ammunition Depot was constructed.

Considerable testing of concrete for the Bureau of Public Roads jobs—that is, the forest jobs, was also done. All of the concrete samples came to us rather than sending them over to California or to a commercial laboratory. We also tested some of the oils used by the Bureau of Public Roads on the forest jobs. The Bureau of Public Roads

had a testing engineer who operated in a supervisory capacity. I do not remember just when this was done, but I do remember it was Mr. Don Steele who was appointed to this job. But I believe he came on as a testing supervisor later in the 1930s.

Additional chemical testing equipment, such as glassware of various kinds, burettes, beakers, and accurate thermometers were added. The chemical tests were also done as usual. Mainly, these were tests on steel and cement, sometimes on paint pigments, and miscellaneous materials. The chemical analysis was pretty much my responsibility in 1929 and part of 1930. After that time, I believe 1931 or 1932, we secured the services of Ray Griffin, a University of Nevada graduate who had majored in chemistry. From then on, Ray did the chemical work and most of the oil testing. I did a lot of work in the field after 1930, and was out much of the time.

There were certain things, of course, which we were unable to test, for example, lumber. We usually accepted an inspection report from the West Coast Lumbermen's Association or other approved outfits. Sometimes we required the services of a private testing laboratory, such as the Robert W. Hunt Company. When structural steel was used, it may have been fabricated in one place, [and] the original ingots poured in another place. Robert W. Hunt was located all over the country, so we usually hired that firm to take care of both mill and shop inspections. The Bureau of Public Roads concurred in this procedure; it was the same kind of procedure they had used. We were unable to send people out of Nevada back East to watch such details as that. So it was very handy to have a reliable testing agency do that kind of work for us.

The following is a summary showing the number of samples of various kinds of materials tested during the 1929-1930

biennium. Concrete materials, which included, of course, concrete cylinders, concrete sand, concrete gravel, Portland cement—1,032. Ferrous materials, such as reinforcing steel, castings, and so forth—721. Gravel, rock, base and surface and borrow materials for base and surface on all types of roadways—449. Chemical analysis, special analysis—15. Miscellaneous tests, unclassified—18. Tests having to do strictly with research—or, rather, samples—135, and field samples tested in the field—944, with a total of 4,345. This does not give the total number of tests, but rather the total number of samples tested. Some samples were tested for several things; some had as many as two or three or four tests per sample.

The eighth biennial report covered the period December 1, 1930 to June 30, 1932, and the directors at that time were again Fred Balzar and Ed Peterson. But Gray Mashburn replaced M. A. Diskin. Durkee was still the state Highway engineer; Mills was the assistant; Holcomb, the office engineer and secretary of the board; and E. C. Pohl, still chief accountant. And in the departments, again, there was J. P. Ross, an equipment superintendent; George Egan was made chief draftsman; L. M. Hardy, bridge engineer. F. H. Morrison was testing engineer; August Berning, Jr. was the field engineer; Dale Pruett, the right-of-way engineer; and the division engineers were the same as 1930.

By June 30, 1932, all of what was known now as U.S. 40 was graveled and was oiled as far as the California state line to Dunphy. And U.S. 50 was graveled, except Carroll Summit, practically all the way. And it was oiled as far as Sand Springs, beyond Fallon, and it was graveled from Ely north, toward Wendover, and most of the highway from between Carson City and Las Vegas was pretty well graveled. From Reno north to

the state line was graveled, and paving was started there. And Carson had the main street widened to some extent and surfaced with a type of asphaltic concrete. And there was some oil-treated material between Carson, on [Highway] 395, and the California state line near Topaz. Some of the Tonopah vicinity was also oiled. Part of state Route 91, from the California line through Las Vegas to Mesquite, was oiled. The road from Wells north was partly graveled, also Winnemucca north, and Route 8, part of that was graveled. Caliente to Ely was graveled, and from Tonopah to about forty miles west of Ely. When I say these were graveled or oiled, I do not mean that it was all done in that year. I mean by the end of that biennium, that much had been completed since the Highway Department had begun operations.

In referring to the testing in 1930-32, soil testing program was commenced and was required on all new construction. That was meant in addition to new equipment and new methods. Also, the detailed material survey was required in order to upgrade all materials used. An attempt was made to definitely fix the amount of oil required as nearly as optimum as possible. And during this period, there was a change from using the old 60-70 fuel oil because what were called “cutbacks” were coming in. These cutbacks were made by taking the penetration grade asphalt and cutting it back with a solvent such as raw kerosene or raw gasoline. The purpose of doing this was to control the curing time, at least, theoretically. Some of the old road oils were very slow in curing and setting up. But by taking the hard asphalt and applying, say, twenty-three to twenty-six percent of kerosene to it, it would become liquid, and it would be heated up to a temperature (not to exceed the flash point of kerosene), in which it was applicable to roads just like road

oils. Eventually, these were called “medium curing.” And then there was another type, the one I mentioned by cutting back with gasoline, which was called the “rapid curing.” We found those were not too applicable in the state of Nevada because the curing was sometimes so rapid that a thorough mixing job could not be done.

In this biennium, the Reno-Carson highway was reconstructed, or, at least reconstruction was under way. The old highway, as stated before, was eighteen feet wide from Huffaker’s to Reno, and it was only fifteen feet wide from Carson to [Huffaker’s]. The plan was to widen it to twenty feet, using asphaltic concrete on the sides and over the top. The first job undertaken was let to Clark and Henry Construction Company, and that included the section from Steamboat, approximately, to Washoe Summit. The second section was let the following season to French and Westbrook, King and Jones, and that included the section from Washoe Summit to Carson City. The final section, from Huffaker’s into Reno, was let a year later. I believe that was probably about 1932.

Now, this was the beginning of asphaltic concrete construction, using the hard asphalts. The hard asphalts were listed by penetration grades, the lower numbers being the hardest. Those were something like this: 40-50 penetration grade, 50-60, 60-70, 70-80, maybe 80 to 100, and then there were softer ones later on, 100-120, and so forth. That means that the asphalt had that low a penetration. In other words, if you used one of low penetration, say, 40-50, the temperature at which it was applied had to be much greater than using one of, say, over 100 penetration. We started out using about the hardest grade of asphalt known at that time, 40-50 penetration. That was used on the section from Steamboat to Washoe Summit, and the plant setup was in

the yard of the Smith-Peterson Company on the Truckee River, near the east city limits of Reno. And Smith-Peterson furnished the aggregates, and, of course, Clark and Henry had the asphalt plant.

Before this took place, three of us were sent down into California to study asphaltic concrete preparation and construction. I don’t remember the exact time we went down, but it was in the spring of the year, as I recall. The three sent down were [J. Leslie] Hancock, who was to be a resident engineer; Jim Armstrong, who was the chief maintenance man in District Two; and I was sent along, representing the testing laboratory. Frank Morrison was busy at the time and was unable to go, and also, as I have stated before, he was very hard of hearing. It was a little difficult for him in situations where he had to depend upon his hearing. I was glad to have this trip, and I learned a lot.

We first went down to the job at Paso Robles. My particular part was to observe the test done on the job and the operations of the asphalt plant. But I also got the chance to observe some of the field operations, that is, the laying and rolling. Hancock and Armstrong paid more attention to that, and very little attention, of course, to the tests that were required at the plant. We went from there down into Imperial valley and observed another job. While there, we had a little extra time. We went over the border and had a very short visit at—I think it was Calexico. I believe we were gone for two weeks or more.

One rather humorous incident happened on this trip. On our way down, we stayed overnight in San Jose. We used Jim Armstrong’s car, which, I believe, was a Chandler. Jim thought the world of that car, and he was worse than a farmer with his best workhorse. He didn’t want to leave it too far away. So the

room we chose in San Jose was only a half a block from Jim's car. And we agreed at the time we would never tell anyone what kind of room it was. I believe it cost us either forty cents a night, or fifty. It was really a flophouse, but we did stay there [laughing].

Upon returning from San Francisco about the time the asphaltic concrete was ready to go, I was assigned the job of breaking in the tester at the laboratory. Hancock was to break in field inspectors on the job. The man we hired to do the laboratory work was Nott Leete. He was an elderly fellow, perhaps in his late sixties. His family had owned the Leete saltworks, which was located between Fernley and Lovelock in the so-called swamp area. Nott had been an assayer, and he was meticulously careful. The tests he had to do were principally gradation tests of the sand and rock used in the asphaltic concrete.

Rock was binned usually in three different sizes. The base course rock was very large maximum size, about two and a half inches. The screens we used to test with all had round openings in those days, rather than square, and were very heavy themselves. The base rock for the base course, which was put in alongside the Portland cement concrete on either side, was two and a half-inch size down to Number 4. And, of course, along with that, went a certain percent of sand, which was graded from Number 4 down to dust, but graded in such a manner that there was not an excess of very fine material. Then the leveling course, which went over the top of the base course, and also over the top of the already laid Portland cement, was, as I recall, inch and a quarter—or, perhaps it was an inch and a half, with the round sieves, to Number 4, with also, an addition of sand to fill out the voids. And the surfacing course was three quarters of an inch, maximum size, down to Number 4, plus the sand. The sand was obtained from a

deposit out near the Wedekind mine. Asphalt was added to the base course in an amount of about four and a half to five percent. The leveling course had about the same amount, and the surfacing course had a little more.

Nott Leete's job was to check these asphalt quantities, and also, to run sieve analyses on the several grades of aggregates, also, to sample them for confirmatory tests to be made in the headquarters laboratory. And he also, as I recall, took samples of asphalt from the tank cars shipped in by rail. Samples of the asphaltic concrete, itself, after being poured, were taken out on the job. I pioneered in that, and the method in those days was to take an old axe and whack chunks of the pavement out and send those into the laboratory for extraction tests, checking them out on asphalt, and tests to check the gradation of the aggregate after asphalt was extracted.

I said that Nott Leete was very meticulous, and he was. But it so happened at this time that the Bureau of Public Roads was breaking in young inspectors who were making studies of asphaltic concrete. One of them was assigned to our job, and he went about the plant and watched the tests. He wore a pair of heavy shoes. The testing laboratory had a wooden floor, was fairly sound, but not vibration-proof. I'll never forget the look on Nott Leete's face whenever this young engineer would come in to see how the test was going. Nott would be weighting on a Harvard trip balance, very carefully weighing. This young fellow would walk across, clomp, clomp, clomp, and Nott's balance would go jump, jump, jump. He would take off his glasses, and if looks could've killed anybody, I think the looks would've taken care of that young fellow. But he seemed to be oblivious to Nott's feelings [laughing].

The laboratory equipment in this [laboratory], which was perhaps our first field

laboratory for asphalt testing, consisted of the balance and the sieves. All the sieving, at first, was done by hand, shaken by hand. But later on, with the help of Frank Morrison and "Pop" Roy, as he was called, who was in charge of the blueprint room, but who had been a very fine draftsman in his day, and also a contractor, a machine was devised with a crank on it which would take a nest of the small Tyler sieves used for sieving the sand, and would shake them down pretty well without doing everything by individually—each screen by hand. In other words, a nest of screens could be used on this, similar to the sieve shakers we had in the headquarters laboratory, although ours were run by electricity. Of course, the containers for the oil samples and containers for the gravel and sand samples also were present. In other words, the laboratory equipment in those days, for field work, was quite simple.

I enjoyed the field experience, and for the next several years I covered a good many jobs in the field, at least part-time. About this time I was also made the assistant testing engineer, and we began to get more help. As I said before, Ray Griffin came in about 1930 or '31 as a chemist, and Norman Noteware came to work, I believe, in 1932. Norman had gone to school to me as a freshman in high school. I believe I had him in general science. He was a local boy, and we found Norman to be an excellent worker. As I recall, he stayed with us for several years until we finally helped him decide that he should go to college, which he did, in later years. He attended College of Pacific and graduated there as a chemist and went to work for the Standard Oil Company. There'll be more about Norman later.

In the 1932 biennial report, a list was made of the tests made. At this time, headquarters laboratory tests and field tests were all lumped together. At the time, of course,

there was no construction department, and the field testing was pretty much under direct control of the central laboratory. There were very few field laboratories, of course. But in concrete materials, there were 2,813 tests—not samples, but tests. Metals—2,371; surfacing and base gravels—3,370; bituminous materials (that is, asphalts and asphaltic road oils)—4,210; various chemical analyses—267; and miscellaneous soil tests—3,300; and then the special tests (including high early-strength cement, special oil extractions, and cooperative oil tests)—669, and field tests under direct supervision of the central laboratory, totaled 1,180, making a grand total of approximately 18,230.

I believe it was in this particular biennium when several states and the oil companies and the Bureau of Public Roads decided there should be a definite set of specifications. Each state had concocted its own specifications. Thus the oil companies were forced to make and store dozens of varieties of liquid asphalt and penetration grade asphalts. Before specifications were written, under the supervision of the Bureau of Public Roads and with the cooperation of the producers (which really amounted to the Asphalt Institute, as it was later called), special samples of many, many products were sent to each of several laboratories in the Western area, particularly the state laboratories. The Bureau of Public Roads laboratory in San Francisco also participated, and there may have been others. Each laboratory was sent samples of the same kind of materials, tests were run, and this data was forwarded to where it was more or less centralized and the results computed. At the same time, meetings of materials engineers were held, sometimes in conjunction with annual Highway Department meetings, sometimes held as special meetings. And from these meetings, and from the results of

these tests, there finally resulted a series of specifications which all the states could use. In other words, there was one set of specifications which work in, say, Utah, Nevada, California, Idaho, Montana, and so forth, although there were certain exceptions. California, for example, had a certain few varieties they wanted to use for special purposes, and other states did the same. But it meant that the oil companies could then store greater quantities of a particular type because there were not so many types to store and everybody was using practically the same kind of material.

One of these meetings occurred rather late, when the thing was pretty much finalized, and I believe that was about 1936. It should not be included at this time, but I recall it was during the time that the Bay Bridge was being constructed, and we all had a nice look-see at that operation.

After Ruth's return (I believe it was sometime in early 1929), my sister arrived from Colorado. And she obtained employment in Carson for a short time, and went from that place out to Stewart, where she had charge of the cooperative boardinghouse for the teachers at Stewart. In fact, she was the cook and chief bottle washer. It was good to have my sister here at the time because during the summer of 1929, Mrs. Little went back to Grand Junction to spend some time. She rode back as far as Grand Junction with Mr. and Mrs. Damon Carr, who were going on vacation. They were our next door neighbor north of us. Mr. Carr ran one of the drug stores in Carson City. My sister was here at the time, so we managed to spend some of the time that summer fishing and taking a few sight-seeing trips. Ruth returned late in the fall. She was carrying that winter, our second child, who was born July 17, 1930. We named her Joan.

In the meantime, February of 1929, we moved from the Lindsay house, in the southern part of Carson City, to the Herman Smoot residence. We rented the Herman Smoot residence, which was on Nevada Street, I believe, and we lived there for almost two years, as I remember. I recall for my thirtieth birthday, which occurred December 9, 1930, my wife and sister gave a party. Most of my Highway friends and others [attended]. That, as I recall, was a big steak feed plus an all-night poker party. A good time was had by all.

During this time, about the only community activities I was involved in was the Carson City band, and, I believe, around 1932 (it may have been 1933 or even later), I joined the state detachment of the National Guard. I'm quite sure, at least that was after 1932.

Another sort of disconcerting thing happened to us during the year 1931. Our baby, Joan, became quite ill. I believe that was along in September. She had the habit of picking up everything on the ground and putting it in her mouth, and she came down with a severe case of colitis. Dr. [Noah] Rouse was our doctor. We were very Thankful to have Dr. Rouse. He had had many of these kinds of cases and knew exactly what to do. Little Joan was put on a very strict diet of protein milk, and she was also given doses of what were called addophilus bacteria. She was very ill for two or three months, but she finally came out of it, thanks to the extra care of Dr. Rouse.

I'll never forget this little girl, who was a little more than a year old—well, she was perhaps a year and a half. She could talk to some extent, and when she became well enough, she could, again, walk. We were having breakfast one morning, and regardless of what meal, she had to use her usual diet, which was this special milk, and some other

things. Ruth had made coffee cake that morning. It was our habit to say the Lord's Prayer each morning at the breakfast table. As we started out to say the Lord's Prayer, Joan came forth with a statement like this, "Please, Dod, dive me toffee take for breakfast." Needless to say, she got it.

I believe it was February of 1931 when we were called on by Mrs. Gies, our former landlady. As I said before, she was of Welsh descent, and she had an accent. She came down, and she said to me, "Lawrence! I want to sell you the cottage."

I said, "Why, Mrs. Gies, we can't afford to buy the cottage."

"Oh, yes, you can," says she. She says, "Here's what I will do. You pay me twenty-five dollars a month until you have paid me twelve hundred dollars, and I will pay the taxes the first two years, and when you've paid me the twelve hundred dollars, the cottage is yours."

We couldn't turn it down. The cottage contained a fairly large size living room, and a large size bedroom, and a long, rather large kitchen, and bathroom, and a washroom, and a small bedroom, and an old shack of a woodshed. We took up Mrs. Gies on this proposition, and we lived in this little house for several years.

I shall discuss the events in the Highway Department, particularly those which affected the testing department in the early 1930s, probably up through about 1934. The increase in automobile and truck traffic in the early thirties was probably due, in large part, to oil treatment of much of the main highways and some of the secondary roads. This caused a great clamor for more and more oiled roads because transportation was made easier, and thus, business became better. However, the Nevada state Highway Department was limited in what they could do by lack

of enough funds. While the government furnished, say, approximately eighty-seven percent of the funds, the state thirteen, for the regular federal aid system; and while the Forest Service roads were constructed one hundred percent by federal funds, it still was not enough to meet the clamorous demands of the times. Nevertheless, the Highway Department had made great progress with what meager funds were available. I think the economics of the thing was due to really good engineering. And I believe the laboratory had a good part in that, as I will explain later, in the setting up [of] aggregate sources so a contractor would know exactly where they could get the kind of aggregates they were looking for.

The fact that more roads were built and more improvements made by oiling and by hard-surfacing with asphalt, some of the urban roads—the more heavily traveled roads, of course—called for more and more control of quality; thus more samples and tests and inspections had to be made. This required more personnel and more equipment. In the period from about 1932 to 1935, the Highway Department, of course, was still under the administration of Sam Durkee, as Highway engineer, and there were increases throughout the department—that is, increases in personnel. Some of the records are not complete, but I do recall quite well the laboratory personnel in this period. In 1929, as near as I can remember, we had about four or five, maybe six, three of whom were kept in the field. And as time went on, up to about 1935, the increase was from, say, about ten to twelve, with some extra help occasionally in the summer.

In this period, of course, Frank Morrison was the chief testing engineer, and later in the period, I was made assistant to Mr. Morrison, and Billy Robohm still had charge of the

concrete lab. And the man whose name I had not mentioned heretofore, but who had been at work in the department, I believe even before I came, his name was Richard McLain; Dick McLain we called him. Dick McLain had a great nose for gravel. It seems he could find suitable gravel deposits which were overlooked by other people. And there was Norman Noteware, who graduated from high school about 1932, and he immediately came to work in the laboratory. And a fellow by the name of Clarence [F.] Meginness came in about that time, or perhaps a little later. I had been doing a lot of the chemical work and some of the oil testing, but a young man by the name of Ray Griffin, who was Lee Scott's nephew (Lee Scott held a state position at the time), took over in the lab in the chemical work, as he was a graduate from the University of Nevada and majored in chemistry. About that time, or perhaps it was around 1934, the P. L. Woodgate family moved to Carson City from Lovelock, and Percy, or "Woody" Woodgate, as we called him, was employed in the laboratory. Another University of Nevada graduate—I believe he was a graduate—by the name of Steve Nielsen came in about 1934 or '35. He also was a chemist and he didn't stay with us very long. But while he was there, he did do quite a lot of the laboratory work in the chem lab and oil labs. About the same time, Melvin Ruedy, the son of Clarence Ruedy, of Reno, also a University of Nevada graduate, came in. I'm not quite sure of the exact dates. I do know that Donald Olmsted, the science and math teacher who took my place at the high school, did come in for one or two summers to help out with the surer work. But during this period, we still had no girl in the office. We wrote out our letters by hand, in longhand, and the test reports were filled out with pen and pencil, and these, then, were

taken upstairs to the testing department, and signed under the office engineer (which was rather an odd arrangement). Anyway, the office engineer would then get the materials typed and would send [them] back down to the laboratory for preparation and distribution for the mailroom.

I mentioned Don Olmstead's name, and at the present time I will give a short character sketch of Don. He, of course, inherited my Carson City orchestra deal without any extra pay, and he performed that very well, and he also played in the Carson City band. I believe he played bass horn. And Norman Noteware, by the way, also played bass horn in that band. But to go on with Don, he was a very brilliant fellow. He was brilliant in science, and after leaving Carson (I believe he taught here about five years or so), he had gone to work for the government and finally became quite an accomplished man in radio work with Uncle Sam. Don was quite a hand to set up apparatus in as complicated a form as he possibly could, when maybe something simpler would have done it. I recall him having flasks and evaporators and condensers strewn out for a simple test.

And I'll never forget Pop Roy. Pop Roy was an elderly fellow who was in charge of the blueprint room. Pop would come in and look at Don's apparatus, and he would scratch his head a little and say, "Well, Professor Goldberg, I see you've got things all ready to work." Goldberg at that time was the artist, I believe, who illustrated the exploits of Boob McNutt with all the various apparatus, where the cat would tip something, and that would tip something else, and then certain things would happen. I couldn't avoid thinking of that occasion of Pop Roy, or several occasions when Pop Roy would come in and comment on Don's setup.

A very important feature, developed in the early days of the Highway Department, was called the “materials survey.” Now by that, it meant prospecting along a chosen route for suitable aggregates, in particular, for a surfacing course in the early days. They did not worry too much about base course or about soils at that time. But that was the start of it, and I believe Dale Pruett was one of the first men who had that job. And then when Billy Holcomb became testing engineer, I believe he took care of a part of it and had others helping. Frank Morrison, when he came in as chief testing engineer, did some of the work himself, but I believe Dick McLain was hired by Frank Morrison and had charge of that materials survey program for several years.

Now in those days, there was very little equipment—that is, heavy equipment, used in prospecting for pits. But the way this was done, when the alignment was chosen, and when the design was being made, the materials survey man would go over the alignment possibly in conjunction with Mr. Morrison, who might’ve made an initial trip, and would tentatively establish sites, depending upon where gravel could be found. The object in finding this gravel and prospecting it and testing it in advance was severalfold. First of all, it enabled the contractor to know exactly where he could get materials of quality because those of poor quality would not be designated for the high-class materials. Materials like common borrow, or fill material, did not have to have any particularly fine qualities, and that could be obtained usually near the site where it was to be used. However, that was not always the case with good gravels for surfacing. [There] might be some long stretches without any gravel at all. Nevertheless, there was no job [that] went without a materials survey, and the

contractor could find exactly where he could get this material, and we tried to give some kind of an estimate of the quantity available. However, this later was found to be rather a poor policy because should we make an error, we would get blamed for it by the contractors, and we finally decided simply to show the area covered and let him do his own figuring on the quantity of the material.

The fact that it was tested gave a chance to get best quality, and as time went on, we tested it not only for common gravel, but to see whether or not the gravel we chose could be used for oil treatment. As explained before, some gravels are not amenable to oil treatment, or were not amenable in those days before certain additives were discovered to make the bad ones more amenable.

Another thing which was done in those days was to prepare what was called “information for bidders,” which included computation of the average haul distance. If a contractor could get gravel pits, say, a mile and a half apart or two miles apart in those days, when the plants were not very large and did not require too much power, that would cut down his haul. On the other hand, if the pits were, say, five or ten miles apart, the cost of haul would certainly affect his bid price. In any event, all the contractors taking out the plans and the so-called information for bidders knew pretty much exactly where gravel could be obtained. And this program was carried on by Mr. Morrison, and later by me, and with use of advanced equipment. But that will be discussed later.

Dick McLain usually had two men with him, and the test holes were dug by hand. One of the men’s name was Gray (his last name), and I’ve forgotten the others, but he had quite a change in personnel from time to time. These test holes were dug by hand, usually about six feet deep, and just wide

enough to let a man in, and where the gravel was cohesive enough, the walls were almost vertical. The number of test holes dug for the particular deposit would depend upon the apparent quantity which would be used over a certain stretch. The samples were brought in from the individual test holes, and each one was run through tests such as sieve analysis, and a test we called field moisture equivalent, and that was called lineal shrinkage in the early days. Later on, these were modified. This would give us some idea of the quality of the material and it would give the contractors the same. Another test applied to gravels was called the abrasion test. The earlier tests were run by what was called the Deval abrasion machine, and later, by a new machine which was much more effective.

Nevada, being a public lands state (in fact, the percentage of public land in the state of Nevada was the greatest of any state in the union), made a big difference in the cost of materials. Whenever possible, we would try to get our gravel deposits on federally-owned land because such deposit could be used without payment of royalty, in those days. Sometimes we could not do this. The gravel was simply where it was found. The best deposit might be on private ground, and, when that was the case, permission was obtained from the owner to prospect—that is, usually, that was the case. Sometimes, without surveys and fences, the owner was not known. But no one complained much. Once in a great while, we would mistakenly get onto private ground when we thought we were on government ground.

Private ownership was a problem on what is U.S. 40, that is, the east-west road from the California-Nevada state line through Reno, on through Lovelock, Winnemucca, Elko, to Wendover. when the original railroad was built, the Central Pacific, as an inducement

to get the [rail] road built, the government granted title to every odd section in a strip—I believe it was either twenty miles wide, or twenty miles on each side of the railroad. That meant that all the odd sections were railroad ground. And much of the material obtained for the construction of what was later U.S. 40 was obtained on railroad ground at a price. The earliest price was three and a half cents a cubic yard. That came up as time passed. So whenever possible, however, if we could get the gravel on government ground, we would do so. However, with a small cost of three and a half cents a yard, it was often more economical to get it on the railroad ground because taking the long haul would eat up the three and a half cents per yard paid for royalty.

Increase of personnel and equipment due to the expansion of the highway system and construction began to crowd the basement area, which had been consigned to the testing department in the Heroes Memorial Building. A heavy increase in oil testing caused during working hours almost continuous production of fumes. The heavy fumes came from evaporating the lighter constituents from road oils in order to produce an asphaltic residue hard enough to measure its consistency by means of the standard needle, or penetration test. Another fume producing operation came from extracting the oil from the gravel. A solvent was used, with a low boiling point, and, of course, fumes were produced in profusion. Solvent, in those days, was benzol. We did the best we could in this basement area to remove those fumes by means of hoods and exhaust fans. Nevertheless, noticeable quantities of these somewhat obnoxious fumes permeated the laboratory and the basement, and some of the fumes actually found their way into the offices on the first and second floors. These problems pointed to the need of an entirely separate building, especially

designed to adequately accommodate all testing operations and to effectively remove the fumes. This recommendation I made personally in written form in the 1929-1930 biennial report. Action on the matter, however, was not definitely undertaken until several years later. Conditions under which this was brought about and a description of the new laboratory building will be discussed later on.

The biennium of 1929-1930, which was the seventh, and previous biennium's, covered a two-year period from December first to November thirtieth. But I believe it was the 1931 legislature created an act changing the fiscal year for all state departments to the period July first to June thirtieth. Thus, the eighth biennial report covered the period December 1, 1930 to June 30, 1932. It was five months short of two years. The total number of samples of all kinds and the total number of tests were respectively 6,324 and 18,255 for this bobtailed biennium. These samples covered eleven general categories, and thirty-one specific varieties of highway materials, and nine special procedures, such as research procedures and field tests. Thus these quantities cover only nineteen months, whereas the figures for the previous biennial reports covered the twenty-four months. The increase in the work load of the testing department is thus reflected in the figures above.

This particular period also witnessed for the first time the use of a so-called cutback asphalt. Now, the original asphaltic road oils were simply residues left over in the industry, and which were used usually for fuel. Now it was discovered that the asphaltic binder, which usually was used back East and other places as a binder for road materials by heating it extra hot and going through a hot plant, was actually the material we were

after. Therefore, someone came upon the idea of first producing the hard asphalt, or the semihard Asphalt, and then converting it to liquid form by dissolving it in solvents. The cheapest and most used solvents would be something like the raw, unrefined kerosene and the raw, unrefined gasolines. In later years, names were assigned to these. The kerosene cutbacks were called medium curings, or MC's, and the rapid curings was the title given those in which raw gasolines were used.

The first use of this material apparently gave excellent results. When we tried to test it, we had a problem with which all chemists are familiar, trying to separate the solvent from the asphalt to determine the percentages of each. I believe our original specifications called for something like twenty-three percent kerosene, and the balance, asphalt. But if you set up a still and try to run off twenty-three percent, you would not [only] get all of the light ends off, but you would also get some of the heavy ends of the asphalt. Therefore, we devised a vacuum apparatus by which the separation was almost perfect. And this was recorded by a very sudden rise in the temperature. Thermometers, of course, were placed in the distillation flasks. Later on, this method developed by Nevada was replaced by a standardized method developed through a meeting of all the western states.

I believe I have mentioned before that it was becoming necessary to test the soils over which the roads were built. Physical tests were rather simple at the time, but we soon discovered it was necessary to run chemical tests on the soils. The situations which brought this to our attention had to do with corrosion of metal by the presence of sizable salts in the soil commonly called alkali, which, really, is a misnomer. I believe the one instance which

called this to our attention most emphatically occurred in the Las Vegas area, between Las Vegas and the California state line. Dan Indermuhl was the resident engineer on this job—or at least he was an inspector on this job. I can't remember which it was. And bare, corrugated metal pipe was placed as culverts. After only a few years, examination of these culverts, made of steel and coated with zinc over spelter coating, showed that the spelter was gone, in most cases, and the pipe, in some instances, were rusted clear through. This led to a matter of testing the pipe and attempting to do something to the structures to protect them from the corrosion, or perhaps to get some kind of material which would be highly resistant to corrosion. Study of this condition continued all through 1933 and '34, and as I will explain a little later, finally we developed a rapid means of making the tests, and we began to find materials which were resistant. It was very evident, from the very first, that any kind of drainage structures placed in the sink, such as the Carson Sink and the Humboldt Sink, would have to be some resistant material because the salt contents in those areas was really terrific. Those were not the only areas, however. Much of the Colorado Basin was affected the same way, and as a matter of fact, in several areas in the state the salt contents were high. These salts usually were chlorides or sulfates or carbonates, sometimes bicarbonates. One of the active ingredients was common salt, or sodium chloride; another, common name, Glauber's salt, sodium sulfate.

In order to speed up these chemical tests of the soils, two things had to be done: a fast method of dissolving the salt in the sample, and a fast method of filtering out the soil from the dissolved material. This was done by designing a bottle wheel which would hold twenty-four old-style square bottles or round

bottles, each holding about possibly a quart of material. These were fitted with stoppers, and the stoppers held the soil and the water in by pressure exerted by metal tops, which were screwed down. Thus twenty-four samples could be placed on this wheel, the wheel set in motion, which turned slowly. That saved individual hand-shaking. We usually left them on the wheel for about an hour. Then the twenty-four samples were filtered individually by means of pressure. The old-style funnel with filter paper, that process was too antiquated and too slow. Therefore, a modified Briggs design of the Pasteur-chamberlain pressure filter was developed. These filters consisted of a steel container in which was fitted a ceramic filter. And the pressure was placed on the solution of soil on the outside of the ceramic filter. And the pressure would force the clear liquid into the filter, and it would come out through the end of it free of the soil, although it was highly colored sometimes. This solution, then, was tested by rapid means in order to determine the chemical radicals doing the damage, particularly the carbonate, sulfate, and chloride. And the results were tabulated in parts per million. The real bad materials would have as many as two thousand to thirty thousand parts per million of a particular radical. Those which were not so bad might vary from a hundred and fifty or two hundred parts to several more hundred. Those which were fairly free usually had less than a hundred parts per million, of these active ingredients.

Any steel used, or iron metals, were affected, and later we found that concrete, Portland cement concrete, was affected in these kinds of soils, especially by the sulfate ion. This will be discussed a little later 'cause eventually, cement companies found ways to make cement in which the concrete would be very little affected by the sulfate radical.

In going back to road oils, in 1933, a set of tentative specifications for road oils and cutback asphalts was adopted by the eleven western states and the Bureau of Public Roads, western branch, and also, by the Asphalt Institute, western branch. Of course, the western states included California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, Arizona, and New Mexico. In later years, Texas usually joined the group in our meetings. These tests, as stated before—or these specifications, rather, and the tests for them were developed by research done by all of the states, the Bureau of Public Roads, and the Asphalt Institute, the Asphalt Institute acting as a clearinghouse. The number of the different products was thus cut down, to the joy of the Asphalt Institute because they had just a certain number to store. In the beginning, when each state had a different specification, there were many, many products to be stored, and the Asphalt Institute simply could not accommodate that situation.

While the number of products was cut down, the number of tests per sample were increased by adding two consistency float tests and a distillation test. Several meetings were held in various places, particularly in the West, to arrive at these decisions after much research and data had been digested and categorized. Usually the meetings were held in Sacramento or San Francisco. These places, while not particularly centrally located, it was convenient to meet there because the meeting places were adequate, and much work was done by T. E. Stanton's staff. T. E. Stanton was the chief testing engineer for the California Highway Department. Francis Hveem, who later replaced Mr. Stanton when he retired, had done a tremendous amount of research in his earlier years, and he was assisted by many others in the California Highway laboratory.

It was probably one of the most progressive laboratories in the highway departments in any of the states.

As far as this float test was concerned, I never was particularly amenable to that kind of a test. I didn't agree with its value, and as far as I was concerned, it was not a good test. The final disposal of this test will be discussed much later.

In the years 1932 to '34, it was necessary to make much closer control of surfacing gravel, of base courses, and concrete aggregates. Due to the great distances in the state and slowness of moving samples from a source, say, near Las Vegas or Elko or Ely into the central laboratory, getting the tests and the results back in time to be effective created a real problem. Therefore, it became necessary to set up small field laboratories for each job, and thus each resident engineer on the job had control of that field laboratory. These resident engineers were brought into the laboratory at headquarters (sometimes their inspectors were) during the winter season to give some training in this matter. These small laboratories were set up right on the job, inside a building. There was not any elaborate equipment. It usually consisted of gasoline stoves for drying wet samples, ample sample containers, and sieves of the right sizes. The coarse sieves, of course, were the big eighteen-inch diameter sieves (that sieving was done by hand), and the fine sieves were usually the Tyler ten-inch diameter sieves, and we did not include all the different sizes, but simply the key sizes, the ones which were more important..

The handwork was difficult with these small sets of Tyler sieves. Therefore, we tried to replace the hand method—that is, by individually shaking through each individual sieve—by placing a nest of sieves on a machine. The first machine was designed by

our Pop Roy in the blueprint room, who was a very good mechanical engineer, as a matter of tact. However, it was turned with a hand crank. This was replaced a little later by means of a gasoline-operated shaker. The model used there was designed by the Bureau of Public Roads. We adopted their model and had these machines made up in the Reno shops.

Some of the simple concrete tests were also made in the field and had been made for some time, such as the slump test, which gave consistency of the concrete. Tamping rods were provided, of course, and the making of the concrete cylinders, which gave an indication of the final strength of the concrete. The tests of the cylinders, of course, were always done in the central laboratory. The field labs were not equipped with compressive strength equipment.

In the 1932-34 biennium, the total samples tested included ten general categories. In these categories, these field camp samples were included. The total number of [samples tested] was 12,473. No attempt was made that year to determine the actual number of tests. This is 12,473 actual samples tested. Sometimes two or three or more individual tests were given to each sample. But this amount approximately doubled the 1930-32 number of samples tested.

I do not intend to go beyond 1934 at this time, but in the fall of 1934, elections were held, which resulted in a change of the Highway administration in 1935. A new board came into power, and, of course, politics being what they are, a new Highway engineer came in at that time. It just so happened that Frank Morrison and I were in Reno that night when election returns came in. We were just wondering, after we heard the news, what would happen to us. At that time, of course, there was no such thing as a personnel system. All the people working for the state were

subject to disposal at the will of the powers that were at the head of things at the time. We were waiting for a train. The SP train was to take us to Sacramento for one of these asphalt materials meetings. I might discuss that meeting because after the meeting, we were then invited by the California Highway Department as their guests—that is, all the western state testing engineers were invited as their guests, to travel to the Bay area and view the construction of the Bay Bridge and learn about the problems.

We arrived in Sacramento that evening, got our room, and attended the meeting the following day in one of the California State Highway Department assembly rooms. The subjects were, of course, specifications, oil specifications, and there were a number of speakers. Since it was very difficult for Frank Morrison to hear what was going on, I tried to act as an intermediary to convey to him the best I could what was going on. I doubt if I succeeded very well. He had a hearing aid, but the aid was not perfected to the point where he could really get everything that was going on in the meeting. Nevertheless, the meeting was quite enjoyable, and when it was over, Frank and I decided we were hungry (although we had been well fed). I believe we attended a show, and then after the show decided to get a crab cocktail, which we did. We stopped into a place and had the crab cocktail served. Unfortunately, Frank made a little error and tipped the crab cocktail over in his lap on his suit. This created quite a problem. We were to get up early the next morning and were to be met by [R. O.] Porter, one of the assistants of Mr. Stanton's, who was to take several people on to San Francisco in his car. We woke up early, and I tried to get Frank's suit down to a cleaner. I finally succeeded in doing it, got the thing down to the cleaner, and about an hour and a half, it came back. Frank put it

on. I looked all right, but the doggone thing still was full of gasoline, and poor ol' Frank was squirming and scratching around during our ride to San Francisco. It finally dried out. Unfortunately, the tomato sauce showed up on the suit. I had an overcoat with me. Frank did not. So I loaned Frank my overcoat.

Our trip to San Francisco was uneventful, but when we arrived in Oakland, we went across on the ferry and studied the Bay Bridge construction by means of a barge. Here was the desert rats from Arizona, Nevada, and others, sitting out on this barge with our feet hangin' over, with the waves almost lapping them, which worried us to some extent. And we paid particular attention to the anchorage in the Bay, and we were told by Porter, who had done the exploring for the foundation (Porter was our chauffeur and our guide of the day), and we were told about his problems in determining the type of soil underneath, boring down through the water, and testing those cores in order to make sure that the foundations would be deep enough and secure enough to support the terrific load of the Bay Bridge. It was a very interesting trip. We also walked up the long stairs up on Goat Island and looked at the tunnel which was being prepared. I felt sorry for Frank Morrison. The day was warm, in November, as it usually is in San Francisco, and here he had this overcoat on in order to hide that catsup.

we were given quite a tour of the east end of the bridge, which was all structural steel construction, and this was explained to us in detail by Mr. Stanton. In order to cut down the weight so that it would cut down the size of the cables which held the bridge, a lightweight aggregate was used in making the Portland cement concrete. Had ordinary aggregate been used, the weight per cubic foot of the concrete probably would have been

something like a hundred and fifty or more pounds. However, by use of a lightweight aggregate, that was reduced by better than one-third, to probably around one hundred pounds of the finished concrete. Cutting down that much weight made a tremendous difference in the cost and quantity of materials used in construction. Now, this lightweight aggregate was made out of clay which was ground fine, moist, and forced through dies of different size in cylinders. A revolving knife cut those cylinders into little chunks. Then they were run through a tubular drier and heated until they congealed and the moisture was all driven off, and, in fact, the moisture made a hard material which was quite porous. It was very vesicular, yet it was strong enough to support loads. This was the lightweight aggregate, coarse aggregate used. Of course, the fine aggregate, or sand, had to be the ordinary sands used. This was interesting because we began to get an idea that some of the natural lightweight aggregates in Nevada, such as volcanic scoria, might be used in a similar fashion.

Frank and I stayed overnight in San Francisco and decided we would entertain ourselves the following day, which happened to be a Saturday, by going down to Palo Alto and taking in the Stanford-Washington football game, which we did. We took the special train down and back. Stanford won the game. I don't remember the score, but I do remember a rather comical instance. There was quite a rush of all the commuters back to that special train to get back to San Francisco. I was a fair runner and got there in time to get on the train. Morrison was behind me. He just barely caught the rod and managed to get on as the train was pulling out. At first, I didn't think he would make it.

This was quite a memorable excursion for two reasons. First of all, we settled quite a

few things at the meeting, important things, in the way of apparatus and tests. And we also had a chance to see the Bay Bridge under construction. One of the resident engineers for one of the sections of the Bay Bridge was Alden Hunting, the son of Mr. Hunting, who was the Nevada superintendent of public instruction. I taught science and math to both of Alden's brothers, Walter and Gordon.

One experiment which was undertaken during this period had to do with Portland cement. In those days, there were not as many varieties of Portland cement as there are at the present time. I had been reading where addition of silica to cement made quite a little difference in the way it set up and the way it behaved. Therefore, I set up an experiment which was performed by Bill Robohm, who was so meticulous in his methods that I knew there would be quite a bit of reliability in the tests. One of the tests on Portland cement was to make up briquettes which were made up one part of cement to three parts of standard Ottawa sand. This sand came from Ottawa, Illinois, and it's a silica sand, and it was used all over the country in testing cements for tensile strength. And the common tests to make these cubes up with the correct amount of moisture, which was measured on a circular table, and then they were forced into molds by thumb pressure at a certain pressure. Bill Robohm had mastered that. Then they were cured in air for twenty-four hours; then they had set up enough to take out of the molds, and were cured in water until they were supposed to've been broken, which usually was at seven days and twenty-eight days, and there were standard specifications for the strength requirements they had to meet.

Therefore, I had Bill make up the standard briquettes, one in one-three mortar, using one part of cement to three parts of the standard

sand. Enough of those was made up so that we could break them at a number of ages.

I also secured a ground silica (I believe it was either diatomite or some other pure SiO_2 silica), and added, by weight, one part of that siliceous material to three parts of cement. The volume, however, of the lighter weight silica was much more than one fourth. Anyway, this new cement contained three parts of ordinary Portland cement and one part of silica. That was used, that combination, as one part of cement to three parts of sand, and making up briquettes in the same manner. All were made in the same manner, but over a period of several days, and were aged in the standard manner. And when they were broken—those broken at the early ages of seven days and twenty-eight gave results showing the regular standard cement much higher in tensile strength than were those in which the silica had been added. They were broken again, I believe, at sixty days, and again at ninety days, and again at a hundred and eighty days, and the rest finally, at one year. And the two strength curves were plotted. It was found that the cement with high silica content caught up in strength with briquettes made of the ordinary cement in about ninety days, and thereafter, actually surpassed it in strength.

This was rather revealing. It would indicate that more silica could be added to Portland cement in situations where the terminal strength over time was a factor. It also decreased the amount of some chemicals which were later found to be rather detrimental to cement.

There was a young man who traveled for the Yosemite Cement Company, in full business in those days. He used to come into the laboratory, and I discussed this test with him, and I believe I gave him some results. While nothing more was done with this, or

nothing was made of it, as far as the Highway Department was concerned, other things interfering, it did have an effect.

About two years later, on one of Priest's visits, he said, "Do you remember that experiment you did with that cement? Well," he says, "our company now is making cement much along those same lines. And this type of cement has the effect of reducing some of the chemicals in there which are detrimental. And we probably will put that on the market in a short time." I mention it because later cements, such as those of low heat of hydration were used (high in silica). They were used in massive concrete such as the construction of Boulder Dam and other areas where massive concrete had to be used.

By low heat of hydration, I mean the cement, upon setting up, gives off heat, as any chemical action does. But by increasing the silica content, or the ratio of the silica to the calcium compounds, the amount of heat given off is not nearly as much, nor is not given off as rapidly. Therefore, it's better to use that type of cement in massive structures such as the Boulder Dam.

Yosemite Cement Company was taken over, probably was sold to Henry J. Kaiser a few years later. It is now entirely out of business as Yosemite Cement. Most of us in the Highway Department thought quite a lot of Yosemite Cement, that is, the regular cement. It seemed to give us a little better strength, and it seemed to be a very easily handled cement.

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I shall discuss some of the family affairs and events which occurred in Carson City, not necessarily connected with the Highway Department.

It was early in 1931, I believe, as stated before, that we purchased from Mrs. Helen Gies the cottage at 704 Phillips. I described previously the rooms in the cottage and the size of the lot. We also discovered soon that there were artesian wells on the lot, as well as in Mrs. Gies's place. And we also discovered that there had been a number of artesian wells drilled in the past, and some of them were still working. One series of wells just west of us was at one time used by the Virginia and Truckee Railroad, and I believe the water had been later diverted to a tank or perhaps several tanks in some of our neighbors' yards. The artesian belt always occurred above the big fault scarp which ran from down below Noteware's on through Carson City, actually under the old schoolhouse, and out across the main highway just above the Dutch Mill, and on out east toward the Ada Jones ranch, and then on out toward the Carson Hot Springs. The artesian water was obtained above the fault scarp, but the only way the ground water could be obtained below the fault scarp was by deep wells such as that put down by the orphan's home. In any event, we put this rather small flow of artesian water to good use in the garden, although it didn't give us much volume. The water was cool and sweet and very nice water to drink.

Something might be said about the houses in Carson City at that time. Practically all of them had either wood and coal stoves; a few perhaps had wood and coal furnaces. The coal had to come from Utah. That was a long way to ship it, and it cost, I believe, around twenty dollars a ton. Wood to start the fires consisted of mill blocks. Mill blocks were about five dollars a load, which consisted of about a cubic yard of these mill ends.

There may have been refrigerators in town, a few, at that time, but practically everybody used iceboxes to preserve food.

We had an icebox out on the back porch. A fellow by the name of Joe Maffi was our ice man. Joe later became interested in property and became a fairly wealthy man and finally moved to Reno.

One thing I noticed about my yard was the tree stumps. I was told that an Italian lady lived there at one time, and she kept planting trees, and as the trees grew, she cut them down for wood. I don't know how many of those tree stumps I grubbed out, but many of them had set up suckers around the stumps, and that was quite a job to clear the land. The land was also infested with salt grass. It was a job to get that out. But I did manage to fix up quite a garden area.

One day I noticed that two old apple trees in my yard lined up with several apple trees east of me, and on down the line for several blocks. I was told that the early Mormon settlers in Carson City had quite an orchard in that area. I don't know the names of the kind of apples we had. We didn't pay much attention to it.

We had interesting neighbors. To the east, there was Clara Crisler and the Leggetts. Mr. Leggett was county clerk. He passed away a few years later, and Marietta Leggett, his wife, took over. Then to the north of us, across the main V & T line, were the Royles. [William H.] Royle, I believe, had some state office at the time. They had children about the age of our children. To the west and a little north of the Royle place was the old Treadway park, which was quite a park in the early days, with poplar trees, perhaps some cottonwoods growing in this park, and it was owned by the Baths. I did not know Mr. Bath. I believe he died about the time we came into this area. But his wife, Carrie Bath, was quite a character. She was, in some respects, she might've been called a ribald character. She apparently didn't care what she said or when

she said it, and people said she was hard to get along with. However, I managed to get along with her very well. I wanted fertilizer for my garden, and I made an arrangement with her to get some, and I tried to pay her for it, but she wouldn't take the pay.

But one day while I was digging there, which was in an area in the old Treadway park which at one time apparently had saloons and other houses, I was digging around, and something shiny came up. It was a ten-dollar gold piece. Instead of putting it in my pocket, I took it in and gave it to Carrie Bath. From then on, I was her lifelong friend.

To the south of us, and to the southwest, lived the Harry James family, and Mrs. Bradley, who was a widow at the time. On beyond that, of course, was the governor's mansion. Clara Crisler was well known in Nevada, especially western Nevada. I believe she was in charge of the U.S. Land Office at the time. But she was a maiden lady. Her mother had lived with her, and I believe she was living with her at the time we first moved into this area. My sister worked for Clara for a short time while her mother was alive. Clara was noted for keeping files of newspapers and clippings. She had bundles and bundles of these. She was also noted for keeping just about everything of historical interest, including costumes of various kinds. Whenever there was a party or a costume affair, Clara could just about outfit all the ladies. She was very well versed in historical events, and she was also a very good cook.

It so happened that I lived right in the center of an area—I was surrounded to some extent by, you might say, old maids and widows. The result was that I always found myself involved in doing neighborly chores. I didn't object particularly, but these were the kind of chores I had to do. Clara Crisler had seemingly dozens of feet of stovepipes in her

house. They were perpetually getting clogged up with soot. It was quite a job to take those pipes down and get them cleaned out, but I seemed to fall heir to that job upon occasion. Mrs. Gies, next door, an elderly lady, very kind lady, as a matter of fact, could not shovel the heavy snows, so there was the snow-shoveling job. Mrs. Bradley lived in a big house which was originally built in the early days, and, I believe, housed some of the early V & T officials, the Yerington family, in particular. It was an immense house, had furnace in the basement, and there was water trouble with a leaky pump. And it fell my lot to see that that pump was taken care of every once in a while. When Marietta Leggett became county clerk, she of course, drove to work. But she had a terrible time getting her car out of the garage, so it usually fell my lot each morning to back her car out of the garage. So I lived in this neighborhood several years, but I enjoyed all of these people.

I must say something about Mrs. Gies, which I may have said before. But she was of Welsh descent and talked with quite an accent. And she was well-read but sometimes had a horrible time with the King's English. Some of the things she said were quite amusing to me. There was one term she used, which I think was a very fitting term. One day I was out in the yard trying to build a walk from stone. Mrs. Gies came over to visit. My wife, Ruth, came out. She looked Ruth up and down, and she said, "Ruthie, where did you get yourself one of them perpetuals?" Of course, she was referring to a permanent. I had to turn my back, or I thought I would split my sides. Actually, that name "perpetual," I thought, was much better than "permanent," because women were perpetually getting 'em.

Mrs. Gies also was fond of a nip every once in a while, and during Prohibition

days, it was a little hard to get. She said to me, "Lawrence, what do you think of this Prohibition?" She said, "I would like to get rid of this Prohibition. What hurt does it do for a person to have a little snort once in a while?"

I remember Mrs. Gies also for some of her superstitions. At Easter time, she would come over to our house and knock on the door and say, "Lawrence, don't you dare open the door. You bring Mossy." That was Moss Helen, our oldest daughter, who was a little blonde girl. "The first person I want to see on Easter morning is Mossy." So I complied with her wish. Then she said, "If the first person you see on Easter is a blonde girl, you will have good luck all year."

I had taken quite an interest in gardening after I was married. I believe I got the start down in the south end of town when one summer Ruth was gone, and I happened to plant some aster seeds. They were pink asters. I took very good care of them, disbudded them, so that the terminal flowers were of huge size with long stems. Thereafter I planted asters every year, regardless of where I lived.

Also, I became interested in gladiolas, and I used to raise gladiolas and asters and always a few vegetables, and I taught my youngsters how to garden. Each one of them, as they grew up, had a small garden. The only one who really took care of it, though, was Joan, my second daughter.

One year (I believe it was the second year we were living in the Smoot house), I raised some very fine asters. Someone suggested I take them over to the flower show, which I did. we also had some beautiful petunias that year. I took the petunias and the asters over to the flower show and won first place for the asters. Something happened to the dish of petunias. I think it got set down on the floor until after the show started and then put back on the

table. But they were beautiful large petunias, but they didn't get a ribbon.

Hiney Cooper, the Reno florist, asked who raised those asters. He found out that I did it, and he came over to me, and he says, "Are those scrubs yours?"

And I says, "Yes."

He says, "I'd like to get some of 'em. Have you got many?"

I said, "Yeah, I've got quite a few."

So we made a deal right then and there. I would get two dollars and a half a hundred if I would furnish him with asters equivalent to those which I had on display. This I did, and he told me how to ship them. I got large paper boxes, and you lay the plants down, flatwise, no water (no water on the flowers or the stems; you can put them in water overnight, but then see that the stems are dry), shipped them dry; then maybe you could put one or two, sometimes three layers in a box, separated by newspapers, and shipped them dry over to keno. I did that for several years. I didn't make too much money, but I was interested in doing it, and Hiney Cooper seemed to enjoy those asters.

I raised a good many plants in a cold frame or regular hotbed, and I supplied my neighbors and many of the Highway people free of charge with various kinds of plants, such as asters, petunias, tomatoes, peppers, and that kind of thing. I finally became such a gardener that I had to go around telling people how to do it. That will be explained later because most of this was done during the wartime years.

I had one section of my yard set aside for asters, in particular, and I had them separated by kinds and by colors in oblong beds, with the edges of the beds raised so that the entire oblong bed would hold water, and that's the way I irrigated them. These were very beautiful in September, and I recall one time

that Harry Brooks was running the V & T engine up the freight track. He stopped the engine, and he and the fireman came and walked through the yard and watched the asters. Every time he came by with the engine on the old freight track, he always stopped and looked at the yard. Another interesting item relating to the V & T I shall explain a little later.

But first, I must say that our third daughter arrived June 4, 1932. We named her Ruth Elaine. But because her mother's name was Ruth, she was always known as Elaine. Thus, I had the three daughters, Moss Helen, Joan, and Elaine. Elaine was born in the little cottage with Dr. Rouse attending. The other two girls had been born in Reno. Moss Helen was born in the old Reno Hospital, south of the University. Joan was the first baby girl born in the new St. Mary's Hospital. Bart Hood attended the birth of the two oldest girls—Dr. Bart Hood, I should have said.

Early in the spring of 1933, Herbert Hoover, having been deposed as President, decided to make a visit to Carson City. He and Mrs. Hoover arrived on the V & T early in the spring of '33. we had heard about it, and suddenly, as the train went by, I remembered about it. I was in my dirty garden clothes. Ruth was not dressed, the kids were not cleaned up, but regardless of that, we grabbed up the kids and went down to the Virginia & Truckee depot, and we were able to shake hands with Mr. and Mrs. Hoover. Mr. Hoover picked my oldest girl up in his arms, Moss Helen. He looked over her, he says, "I can count the freckles on your nose."

Our 1926 Chevy played out about that time. It simply had worn out. So I left it in the backyard and let youngsters come and gather spare parts. About three years, we didn't have a car. We had so many family expenses that we simply could not afford it. Of course, the

children had the usual childhood illness, such as measles and chicken pox and croup, and so forth. It seems we had a doctor for one reason or other at all times. In those days, doctors made calls to your house, and they did this very frequently when you had sick children.

I had a slight accident one time. I was up in one of the old apple trees, pruning, stepped out on a limb which gave way, and came down to the ground in a heap, landing on my right shoulder, and could not get up. The youngsters playing nearby thought that was rather funny. And I told 'em to go get Mother, which they did. I still could not get up. She called the doctor, and I was examined thoroughly, and put to bed and had to take sort of a rest cure, although no bones were broken, for about two weeks. And I recall how attentive Dr. Hairier was to me. I also recall how attentive Dr. Rouse was, and later on, Dr. Thorn, as the old-time physicians who really called on people who were sick. We had no hospital in Carson City then. The hospital cases had to be taken to Reno.

Although we had no car, my sister, Helen, had her car, and she often came to our rescue when we had to have a car.

Along in the spring of 1932, we had an offer by Norman Brown, who was the head of the power company, to purchase an electric stove. The Sierra Pacific Power Company at that time handled such things. So we disposed of the old wooden coal range and bought a little electric stove, called the Graybar make, I believe. It had an incinerator along with it to produce heat for the room. The stove, itself, could not be used for anything but cooking. So that was our first experience with an electric range, and we've had nothing but electric ranges for cooking ever since.

Fred Berning came up to help install the range. I spent many an hour with Fred

Berning years afterwards in the National Guard. Hut that is another story for another time.

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It has been helpful to my memory to review the state Highway Department biennial reports from time to time because there's some difficulty in fixing dates for certain events. However, there is one thing we do not find in the biennial reports, and that is a complete list of the personnel in the state Highway Department. I think we should, in particular, give the resident engineers' names who served in the period from about 1929 to 1934. The resident engineer has some real tough responsibilities, in most cases. They work long hours. Of course, they have helpers. They have an assistant who usually takes care of the surveying, and they have sometimes inspectors and just common helpers, and occasionally an office man, at least, nowadays they do. But these earlier resident engineers had no office help, and they would finish their day's work, then do their office work at night.

As best I can remember in this period, there were the following resident engineers: Dan Indermuhl worked for the department for a number of years, and then he left, and I believe he went to South America, doing what, I do not remember. But then he came back about eleven or twelve years ago and still is with the Highway Department.

There was W. R. Parry, who became division engineer at Ely, Division Four, and Julian Glock was an old-time resident engineer. Julian, I believe, was raised, when he was a young fellow, at the orphans' home. In his later Highway years, he became district engineer at Elko, and then I believe he was transferred to Ely after that.

There was J. L. Hancock, a longtime employee. I believe he started out with the Highway Department along in 1918, running a drag line at Lahontan, where the gravel was prepared to make the Portland cement concrete roads, 1918 to 1920, between Reno and Carson. Hancock became district engineer in District Two, out of Reno, a position which he held for many, many years.

There was J. D. Meacham. I don't recall when Meacham started with the state, but I'm pretty sure he started out as a resident engineer. Meacham became division engineer in Division Five at Tonopah, and later than that became construction engineer for the state Highway Department.

Then I am not sure about Art. Loforth. Loforth probably started out as a resident, but he preceded Hancock as division engineer in Reno.

And there was George Egan, whom, I believe, started out with the department after graduating from the University of Nevada as a field man, surveyor, and assistant resident engineer, then probably a resident engineer. He specialized in the construction of bridges. He came into the Highway Department as bridge engineer (I've forgotten the year, probably about 1932 or '3), and later on was made chief design engineer.

There was another resident engineer by the name of C. C. Allen, who worked for the state for several years, but I do not remember what happened to him. He left the state and went elsewhere, I think.

Herbert Squires, whose father, I believe, was either a newspaper publisher or some official in the Las Vegas area. Herbert was an old-time resident engineer, later became assistant district engineer in Reno, District Two.

And there was Dale Rose. Dale eventually became the division engineer in Division Six, which was created in later years, with headquarters in Winnemucca.

And there was Paul Robbins, who, I believe, started out as an inspector and surveyor, became a resident engineer, and later became division engineer at Elko, District Three, and eventually, for a short time, at least, became assistant Highway engineer.

And there was W. O. Wright, Otis. We remember Otis for many things. A sideline of his was photographing close-ups of flowers and animals, particularly flowers. And he made quite a study of the plant life on the desert in various parts of Nevada. And occasionally he gave lectures; illustrated by the pictures he had taken. Otis was, for many years, district engineer at Las Vegas, in District One. Of course, he later became Highway engineer just prior to the promotion of John Bawden to that office.

J. M. Murphy was a resident engineer, and later became district engineer at Las Vegas. He was a red-headed fellow, and he was noted for getting things done. I think before anyone knew it, he had a nice office building and some more buildings constructed in Las Vegas. He really got things done. He left the Highway Department, got interested in aviation and in private engineering.

There was Wayne McLeod. "Red" McLeod, as we called him, was an old-time resident engineer. He later became state surveyor-general and became interested in quite a little of the land development in the Las Vegas area.

Then there was V. E. Frye, a very fine resident engineer. I recall some of the projects he was on. One of 'em was from Carson City to Dayton. Frye left the department, I think, probably, in the late 1930s.

Then there was Reuben Eldridge, who was a resident engineer for many years, and he later became assistant Highway engineer in Otis Wright's administration.

The resident engineers, in the early days, took their direct supervision from the district engineers. But the district engineers did not always have full knowledge of certain things, like testing and materials, and not always complete information about the construction of large concrete structures. So the bridge engineer and the testing engineer, and sometimes others made occasional visits to the various jobs as they were in operation, and would assist the resident engineer with some of problems. It was not always the chief or the head of a department who would do that. Sometimes the assistants would go. I made many, many such trips, and I'm sure some of the assistants in the bridge department and in design and others did the same. Of course, right-of-way problems usually were pretty well settled before a contract was ever awarded. But occasionally something would come up where there was a dispute over right-of-way during the life of the contract. So the right-of-way engineer, his chief, or the chief's assistants would go out and confer with the district and resident engineers in those particular areas.

I have already mentioned that, toward the latter part of the year 1934, the election brought in new people, which changed the makeup of the state Highway board, and, of course, eventually, the state Highway engineer. However, there were not too many dismissals, but there were quite a number of people added. I will discuss that a little more, but first of all, I probably should mention that the state Highway board, after the election of 1934, became in 1935 Richard Kirman, governor? Gray Mashburn, attorney general;

and Henry Schmidt, state controller. Kirman and Schmidt replaced Balzar and Ed Peterson. So everyone was a little bit disturbed, in fact, more than a little bit. I recall that my chief was quite disturbed about things. Of course, he had a lot of field work that he was interested in, and he seemed to stay out there, I believe, for more than two months on these field excursions in the early part of 1935.

In the early part of 1935, as I will explain later, there was some lobbying done by the testing department, chiefly by P. L. Woodgate and myself, trying to convince the legislature that we needed a new building. That I will take up later.

The new board dismissed Samuel Durkee May 1, 1935, and appointed R. A. Allen state Highway engineer, who took office May fifteenth. Mr. Allen had been state engineer in charge of water resources and been in those areas prior to this time. The Highway executive staff, as it was called, included (besides Mr. Allen) H. D. Mills as the assistant Highway engineer; W. T. Holcomb, who was made manager of a new department called the highway planning survey; George Egan was made engineer of design; E. C. Pohl was kept on as auditor. Art Loforth was advanced to construction engineer, and there was a new equipment superintendent appointed by the name of W. S. Holesworth. And the office engineer was Everett Harris, E. W. Harris, son of [Walter J.] Harris, I believe, who was the president of First National Bank. Everett, by the way, was a graduate engineer and later left the department and became a professor of physics at the University. Then there was "Bernie" Hartung, Bernard C. Hartung, who acted as secretary to the board, and in the beginning, he also acted as Allen's personnel man. I will say a little more about that later. And E. T. Boardman was appointed bridge engineer. Boardman was a graduate of the

University; his father was a professor there in engineering, and had done work in the East for private people. Then Richard Sheehy was appointed as maintenance engineer. Paul Rawls came in as location engineer, and Dale Pruett as right-of-way engineer. I believe Dale had that job in the beginning. Of course, F. H. Morrison was kept on as testing engineer. A lot of new people were added, and some new departments.

Then there was F. D. Browne, who had the title [of] roadside improvement engineer (it meant some landscaping). At that time, it was thought we should start beautifying some of our roads. Frank Berger was made field engineer, replacing Dutch Berning. The field engineer in those days was the one who would go around and review the accounts of the resident engineers with respect to the progress of the jobs, how much work was done in their pay quarters, and so forth, and then would assist the resident engineers in making up a final report for final payment and acceptance of the job. This was Berger's new job. And there was Fred Greulich, a newspaperman, who was made publicity director. And Herbert Swinburne, a young fellow from Pennsylvania, I believe, red-headed, jolly young fellow, was made the supervising architect. And he was employed for constructing new highway buildings, and I think he assisted in the designing of some of the state buildings.

Then the five districts were handled as follows: August Berning was advanced from field engineer to division engineer in Division One at Vegas. J. L. Hancock took over Division Two in place of Loforth, and Frank Depp took over Division Three at Elko. C. C. Boyer was relieved from the duties in Reno at District Two and sent over to Ely in Division Four. And J. D. Meacham became the division engineer at Tonopah, Division Five.

I've mentioned some of the duties and some of the new sections put in. Heretofore, as I have said, much of the supervision was left to the district engineers—that is, supervision of the construction people, the resident engineers and their gang. And, of course, it was also the district engineer's job to supervise all maintenance in his district. When the Highway Department was first organized, they did have a maintenance engineer, and I believe that was Mr. Boneysteele. But then, for several years, they did not have one. Now, that job was taken over by Richard Sheehy.

George Griffith, who was one of our [resident] engineers who later went with Dodge Construction privately, and eventually came back to the Highway Department as a resident engineer and finally became assistant state Highway engineer, which will be explained later on. Also, there was J. N. Murphy, a big, hearty red-headed fellow, who was one of our finer (resident] engineers. J. N. Murphy later became division engineer, a job which he held until he left the department to do private work.

Having a publicity director was something new, and really was something needed, and Fred Greulich was a logical man to put in that position, a very fine man. I enjoyed Fred's company. He and I located a couple of mining claims together at one time. Herbert Swinburne, as I have said, did architectural work, and when our new laboratory was built, he fell heir to a portion of our storeroom in the back, and that's where he and his assistants operated.

F. D. Browne, "Brownie," as we called him, was given the job of some roadside development, but I believe that was quite limited. About the first things that were done was to plant a few Chinese elm trees, which had become quite popular, along the Reno-Carson highway in Washoe Valley. And quite

a number of these was also planted just above Lovelock on U.S. 40. Just prior to the time Brownie came in, I had my finger in the pie to some extent on this landscape business, and with the help of someone else, we did a few things. We got some free shrubs from the government, and we placed a few of those around. In talking to Bob Allen, he and I thought King Street should have something. So we bought quite a number of hawthorns, *Crataegus*, and those were planted along King Street. They have been pretty well pruned back now, but one trouble with the hawthorn is that it gets fire blight, and we lost quite a few of those trees, and quite a few of them have to be replaced every now and then.

Trouble also developed in the Chinese elms later on, when the elm beetle came from the East. As a matter of fact, the old elms of Carson City suffered, particularly where people did not spray. But the Chinese elm is more resistant, however, to the elm beetle—that is, the old-type cork elms and the others.

By July first of 1936, I believe it was, maybe it was 1935, there were six hundred and fifty employees in the Highway Department, statewide, with approximately a hundred in the headquarters office. That was a greater number of employees than we'd ever had before.

At this time I must make a statement about the change in office. One day in late January or early February of 1935, I had a call from the governor's office. I says, "Oh, oh, here is where I get mine."

However, I was really pleasantly surprised when I conferred with Governor Kirman. He had a very nice attitude, and he began the conversation by saying, "I have heard some good things about you, Mr. Little." I was scratching my head, wondering where, when he explained. He said, "You were quite highly recommended by a person I met in

California by the name of Jack Horn." He says, "You know, my son is a partial invalid, and we've had to keep him in a hospital down at Santa Barbara. And," he says, "my wife and I were down there quite awhile, and we went into a clothing store, and she wanted a particular kind of clothes hanger. And this little clerk in there was so accommodating I'll never forget him. He just hunted storewide for that thing, and he finally came up with it. I called on him in there several times," said he. "And in the meantime he told me he had been in Carson City and that he was friends with Ruth and Lawrence Little. In fact, Ruth Little and his wife were old-time friends from Grand Junction, Colorado. And," he says, "well, knowing that," he says, "I'm going to ask you some rather pertinent questions." He says, "I came into the office here with the understanding that there was some pretty rough parties going on in this Highway Department, and there were some people who just were drinking too much."

He named some names which I will not repeat, and I said, "Well, now, Governor, people drink in all occupations, but I want to tell you that these people you have named are what I call top engineers, and their experience is invaluable. You simply cannot afford to lose those men." I says, "Sure, they'll take a drink now and then, and sometimes they get a little too much, but never on the job, that I recall. I have heard some stories about—occasionally out on the field, there would be something a little out of the way, but," I said, "that did not take place, to the best of my knowledge, with any of your heads of departments or district engineers."

I believe this had a great deal to do with the retention of some of our top men in the Highway Department, although I never said a word to any of them about this happening. But I think I did a good job on that.

After my visit with Mr. Kirman, I felt much more [laughing] confident than I had previous to that time, and decided the next thing to promote would be a new laboratory, to get out of the smoky, crowded quarters in that basement, obnoxious gases in the air, not only in the lab, but upstairs and probably in the top floor of the building, though not many in the Highway Department were too much interested because they felt insecure and did not take the bull by the horns, so to speak. So I decided that was my job. Percy Woodgate was a good lobbyist, so between Percy and I, we managed to lobby that thing through the legislature. I got most of my help from about four men in the legislature. There was Joe Rochon, representing Ormsby County in the assembly, and I believe it was Ken Johnson—pretty sure he was, the state senator. But I also got wonderful help from Jack Fogliani, who was assemblyman from Lincoln County, and, of course, Charlie Russell was assemblyman from White Pine County. And those four gave us good help. But to really get the thing going, we called on the Ways and Means Committee chairman, Raby Newton. That was my first meeting with Raby. In later years, we became very good friends and acquaintances.

We fixed up a date so that the Ways and Means Committee could come over and see the situation we were in. Of course, we got things going pretty good on that particular date. We had all the evaporators running, and the smoke was really coming. And, of course, we had the extraction tests, using benzol, the vapors of which are actually poisonous. We probably weren't doing any more in that respect than we would have done on a very busy day. But nevertheless, we had it going, and it was going full blast at the time the Ways and Means Committee made their visit.

They were conducted through the old basement lab, the old physical testing lab and

chemical lab, and on out, and we pointed out why it was difficult to remove all these fumes, and we also pointed out that it was annoying to the people above us.

In just a few days, the assembly came up with a bill. Our persistence, apparently, won out. The legislature eventually approved a grant of twenty-one thousand dollars for the construction of a separate laboratory, not connected with the main building. We also received a federal grant of seventeen thousand dollars, which could also be applied for the same reason. The contract was let to Joe Dillard of Reno in March of 1936 for twenty-seven thousand dollars, and the building was started at that time. It was made of reinforced concrete, and it was a building forty feet by seventy, just one story. Swineburne was the designer, and he made a decoration on the main floor which more or less looked something like a testing machine with big wheels. He did that as a decoration. And there was a place installed on the roof for the weather instruments. We had always had the weather kiosk alongside the building, which was not a very good place for it because of the influence of the Street, and so forth. The weather measurements is another story which I've not yet dwelt on. I will say a little something about that later on.

This new laboratory had a fireproof vault, and an office, a chemical laboratory, an asphalt laboratory, a soils and sieving lab, and a concrete and cement testing lab. There was also a storeroom in the back with special shelving prepared to retain samples for a period. These samples came in great quantities, and the ones we preferred to retain were the ones on materials survey because those samples were taken long before the contract was let, and sometimes contractors [and] others, would want to come in and see the gravel samples that we had

tested and shown in the special provisions. Then there was a small balance room for delicate weighing, and it was draftproof with concrete table, so there would be no jarring or motion. And finally, there was a separate, although it was a very small room for bituminous extractions, [where] all these fumes were thoroughly removed by adequate fans and other equipment. And the chemical laboratory also had a hood for removing fumes from dangerous acids.

There was quite a little money spent in addition to building the lab for new equipment. In fact, I believe it was about eleven thousand dollars. And the new equipment included the following: an Olson 200,000-pound universal testing machine—that is, we call it universal because you could either pull steel and other metals apart in tension, or you could run the machine the other direction, and you could break concrete cylinders and concrete blocks and other things in compression. And we bought some very good laboratory tables. In the chemical lab we had a regular commercial chemical laboratory work table, something we had never had before. We bought a universal microscope, which could also be used for research. We had a metallic polishing machine for making thin sections, if necessary, to study under the microscope. And we had a new Rotap shaker, electric shaker, for shaking sieves of the small sizes. We had a muffle furnace, which we used upon occasion, a new centrifuge for soil testing, and there were two concrete beam testing machines which could be used in the field, if necessary, as well as in the lab. And there were many smaller items.

At the same time the laboratory was being constructed, another contract was let by the state to Joe Dillard for construction of the new supreme court and library building, which, of course, still stands as the supreme court

building. I presume it does, unless they have moved over to the 1970 legislative building. I have not heard at this date. The library, of course, was a law library, said to be one of the finest west of the Mississippi, and that, of course, was in the same building.

I ran into some problems there in addition to taking care of my end of the laboratory work. I was advised by Mr. Allen that I should keep an eye on the construction, not only of the testing laboratory, but the supreme court building. Joe Dillard seemed to have done a pretty good job on our laboratory building, but when he got to the supreme court building, it was what they call a construction—that is, so-called pans were set up as forms for holding the concrete ceilings, and so forth. The concrete he was using was made so sloppy that the slump must have been at least eight inches, whereas about a three or four-inch slump would be ample. I warned the man about it several times, and he paid no heed, so I shut the job down. However, I was instructed not to do any more inspecting on the supreme court building, and Mr. Dillard was allowed to continue. However, another man was brought in. But I did notice that the concrete looked very much more like good concrete thereafter.

I think all of us connected with the laboratory really had a good feeling when we knew that we could move into a fine new building. However, this was not done during the biennium. We did not move into the laboratory until September of 1936, after the biennial report was made. The number of tests we did that biennium, of course, were all done over in the old “smokehouse,” as we sometimes called it,

The personnel we now had in the laboratory had changed quite a little. Right here I must stop and mention something

about Bernie Hartung's job as a temporary personnel manager. It seemed he filled us up with a lot of people, some of them I do not think were political appointees because they were strangers. But there were two fellows who were supposed to' ye been Ph.D.'s, and I simply had to let one of them go at an early date because if he were a Ph.D., he must not've had his mind on his business at all. His work was not satisfactory. There was another one who had had an injury in World War I which affected his mind, and he would be right in the middle of a job and forget where he had begun or where he'd left off, and would come and say, "I just can't do it." However, he was a good man, a good fellow, and honest, and tried. We kept him as long as we could, but eventually, he had to go, also.

Then there was other people who were given to us. Pat Sanford, the son of [George] Sanford, the prominent lawyer [in] Carson City, was given a job in the lab. But poor Pat had lost motor control so that his motions, especially with his hands, were jerky, and Pat could not do a weighing because he simply could not get the balance. Every time he would touch it, it was too much power to do a sensitive weighing, so the best we could do was try to find some menial job to keep Pat busy. But I believe you could call Pat a friendship or political appointment. Pat had been injured in a wreck. He was a brilliant young boy in school, as was his brother, Graham Sanford [II]. I had both of them in school for a short time, as I recall, when I taught in high school. But Pat was in a terrific auto wreck, and I believe he was unconscious for weeks and weeks. And he finally came out of it to some extent.

We had several others, whose names I do not remember, who were simply not capable of keeping on. By the time we were ready to move into the new laboratory, most

of those people, except Pat and Dr. [Perry] Krebs, were disposed of. In moving into the new laboratory, we finally managed to get a part-time girl in the office. This girl's name was Gertrude Riordan. She came from a prominent family in the eastern part of the state. The Riordans finally moved to Carson City. But Gertrude caught sight of George Gottschalk, or he caught sight of Gertrude, and she was soon taken out of circulation. We then were given a lady by the name of Miss Phelan, Louise Phelan, I believe her name was. She was a rather elderly maiden lady, and she could be efficient upon occasion, and she was, upon occasion. But sometimes, if the notion struck her, it was a little difficult to get her to cooperate. And I believe I could say, without fail, that this was a political appointment.

Other personnel, 1935-36 (some of these might have come in in the latter part of 1936), were the following: there was Melvin Ruedy, Clarence Meginness, then Silvio Mastroianni, who we called "Doc," who later became one of the officials in the health department. I believe he had taken four or five years in medicine. That's where he got the nickname "Doc." Then we had a very, very fine chemist by the name of Carl Gottschalk. Carl Gottschalk was a Ph.D. in chemistry, and he had gone to Johns Hopkins University, and I believe he had taught chemistry in the University of Montana. In addition to being an extra fine chemist, he was also an expert fisherman, and he tied fish flies. I have about two hundred of the flies that he tied at the present time. And he was full of stories about the good fishing in the Madison and Gallatin rivers in Montana.

Carl was used not only as a routine chemist, but I think Mr. Allen had an understanding with lawyer [George] Sanford that some tests should be made on the river waters in western Nevada and in tributaries to the rivers. Samples of the Carson River

taken from way upstream, and also along the rivers in several areas, and from Lahontan Reservoir, and samples of the Truckee, and samples from the Lahontan-Truckee-Carson canal were taken periodically, and these were tested for nitrogen content and other elements which might be called contaminants. This project was carried on about two years, with Carl doing the work. Whatever became of the results, I do not know, but I am pretty sure those are on file somewhere, maybe with the state engineer, an office Bob Allen had held prior to being a Highway engineer.

Carl, unfortunately, had a blood clot form in one leg and had to have it removed, and soon had to have them both removed. He worked with us as long as he could, and then he spent the rest of his time in his home in Reno until he passed away, writing up some of his experiences. He had, to the best of my knowledge, had prepared quite an article on General Custer, his last charge, and the doings. Someone should see Mrs. Gottschalk, Ella Gottschalk, and see just what is available there.

Carl also was a collector of minerals. He had visited Virginia City and Bodie and several other camps, and he had some very fine samples, some from Goldfield, and he had a marvelous collection of minerals. I think Ella Gottschalk, his wife, who survived him, will know what happened to those. I have several samples that Carl gave to me, I believe from Goldfield and some from Virginia City.

Of course, then Norman Noteware was still with us. For a while, later on, he went down to College of Pacific and obtained his degree in chemistry. He worked for the Standard Oil Company for some time until his mother and father both became very ill, and he and his wife, Alice, had come back to Carson (to) take care of his folks. And he came back to work, then, later on, with the Highway Department.

And there was Percy Woodgate, of course, and Billy Robohm was still with us. Then a man by the name of James Goldsworthy was appointed as assistant testing engineer, which made two assistants. James and myself were two assistants to Frank Morrison. Goldsworthy eventually was placed in charge of the materials survey, which had been handled by Richard McLain, although Richard McLain stayed on the job and still worked.

Then there was two men appointed to assist in the materials survey, and the first job they were assigned was [to] determine the availability of materials between Reno and the California state line on U.S. 40, as some construction was to be done up there. C. E. Wood was one of those men—he was an engineer, and somewhat of a geologist, and, of course, Carl Stoddard, a very noted geologist. These two men—I will state this now made probably as much as six weeks' study of that area, and they came back with a fine geological report, but without a pound of gravel that [we] could use on the highways. We sent old Dick McLain on up, and he got the gravel to do the construction. In making this statement, I do not wish to detract from the credibility of either men. Both were very good in their particular fields, but actually, we did not need the geological studies as much as we needed good, usable gravels and sand and rock which could be used in highway construction. However, the geologic study was quite valuable. It covered the glaciation periods and the formation of the diatomite beds and the volcanic action, and it was a very interesting report, as far as geology goes.

Then, in addition to these people, we had Fred Davis come in, and a young man by the name of John Curtis, who had lost one arm. John had been an assemblyman from Washoe County.

Frank Garaventa, quite a noted collector of minerals and specimens, was placed on the payroll, a little later, so was Fred Forbusch. Garaventa stayed with our department some time, but he passed away probably ten years after this time. Fred Forbusch was placed in the laboratory, but his work and the work of Garaventa, for quite some time, consisted mainly of collecting specimens (in the case of Garaventa) and polishing metals and stones for exhibit in the World's Fair. Forbusch, however, was an excellent wood carver, and he was preparing some carvings to exhibit in the World's Fair. Now, this was done a little bit on the side. It was not exactly highway work. Nevertheless, it probably did some good to the state for advertising the kind of materials and the minerals we had in the state. And since we're all in the state's family, I suppose that would be a pretty good way of explaining this thing.

Another employee put to work, I believe, in 1934 or '5, was Steve Nielsen. I believe his name was Sigvard Nielsen. He was a chemist and helped quite a lot in the analytical work at times, but he also worked in the lab. Later on, John Flournoy came into the lab, but I believe that was probably about a year or two years later. I will explain that later.

In these days, there were no commercial laboratories operating in the state of Nevada for hire. Therefore, the Highway Department was used by counties, towns, and cities, and also, quite extensively by Mono and Alpine counties, California, in performing some of the tests for highway and building constructions. We also went out, on occasion, to explore foundations for buildings.

One other item might be mentioned here. I do not recall when Prohibition was abolished, but prior to the time it was abolished, quite a number of acquaintances and people, some of

them Highway employees, would bring in the new batch of brew by their favorite bootlegger, and we would check it for alcoholic content [laughing].

We did considerable work, also, for the Bureau of Public Roads and their Forest Service projects, also, for the Indian Service, in their road building. We kept close contact, of course, with the Indian Service, as well as the Bureau of Public Roads.

Another item checked by Bob Allen, he was assigned, I believe, by someone in the state to take charge of a research project, apparently for the reconstruction of a part of Fort Churchill. And there was one or two men at work, trying to make mud bricks like those made in the days at the time it was built. Many of those bricks were tested in the laboratory. They did not have much strength, as I recall, but we did help out with some of the testing. I don't recall whatever happened to this project because, to the best of my knowledge, there is none of Fort Churchill being reconstructed at this time.

Morris Anderson, an old friend of Bob Allen's, and also an engineer, was employed for a while in the laboratory before we moved over to the new building. I believe Morris probably had been designated tentatively to take my place. But I think my neck probably was saved by Governor Kirman, and possibly Gray Mashburn, both of whom I knew, and I later became well acquainted with Henry Schmidt. But I became very friendly with Robert Allen, and he certainly treated me very, very well all the time he was in the state Highway Department. I made more field trips out of the state with others in the department than I had ever made before, and I was asked to participate in conventions where I had never been asked to participate at other times. I will discuss some of these trips at a later date.

Coming back to our new laboratory, James Goldsworthy was eventually placed in charge of materials survey, and one or two men were assigned to him. McLain stayed on for a while, but I believe he left shortly after that and came on again in later years, but I'm not too certain about this. Goldsworthy was a mining man and also an engineer. However, he believed in keeping strict hours. He worked pretty much by the clock in working hours, and was not known to put in much extra time on things. Nevertheless, he did a credible job.

A new soils department, as such, of course, was added in the next biennium after this, which was the tenth biennium, ending in June, the thirtieth, 1936. In this tenth biennium, all the tests which I will list below—or list a little later on, were done over in the old laboratory. I believe there were seven principal classifications, plus one miscellaneous catch-all classification, which largely was composed of soils. And I'm not going into detail. There probably were a hundred varieties or more of things which we did test, But the concrete materials, which included concrete cylinders, and the sands and gravels used in concrete and the Portland cement, those tests amounted to 3,394. Metallic materials, such as corrugated metal pipe, steel, and reinforcing steel and structural steel, and other metals, amounted to 2,413. And the surfacing, base, and fill materials—1,484. Then the bituminous materials, asphalts and oils—1,580. And 2,036 chemical analyses were made of different kinds of samples, samples of all kinds, including water.

During this biennium, the Reno-Carson highway was finished, and I believe paving had started, and some finished, in several of the urban areas. The asphaltic concrete, itself, the finished product, there were thirty-nine samples of those. And the miscellaneous

category covered 4,584 samples, most of which were soils. And samples which represented special tests and research—1,241, making a grand total of 18,771 samples.

I have made no attempt to tell in detail just what roads were built or just how they were built and when they were built. All this information is available in good form, including costs and traffic situations alleviated, and all the details, in the biennial reports and are available to anyone who wants to take the time to study the biennial reports.

During the Depression years (it seems that was around '32 to '34), of course, the Carson City Bank—in fact, all the banks, I believe, were closed. Wingfield had pretty much control of the banks of the state. The L. W. Littles didn't lose much because they never had very much to lose. But it did make an inconvenience. And at this same time, which was a more or less depressing time, the Highway Department was pressed for money to continue its operations. As a matter of fact, the department was forced to cut down on personnel; but rather than entirely eliminating some of the personnel, they devised a plan whereby the single men, without families, would work part-time. I believe they were allowed to work about three quarters of the regular time. Married people, especially those with families, were not placed in this category.

I do recall that Ray Griffin, who had been working with us prior to 1935, was sent out to Lovelock in the field. And poor Ray just about broke his back with one of these ten-foot straightedges (it must've weighed about twenty-five pounds), checking a concrete paving strip run down through the center of Lovelock, checking it for levelness and grade. That was a back-breaking job for a man who was soft after having worked indoors for many months. But Ray stuck it out and did a good job.

By the way, Ray was relieved of his job in the Highway Department. He had been in a bar somewhere early in Mr. Allen's regime and made some disparaging remarks about the administration, and in those days, they had people who were anxious to hear those things so they could report them as soon as possible, and Ray was relieved of his job, which was the best thing that ever could've happened to him, because he went to work, partly through the efforts of Morrison and myself and others and their recommendations, with the Shell Development Company. And I believe in just a few years he was an eleven Thousand dollar-a-year man, and one of their chief research chemists.

I shall turn to some of the family and personal doings in the period around '32 to '37. Our children, of course, were growing up, the youngest one, Elaine, having been born in 1932. I believe it was about 1933 when my Uncle Charles and his wife, Aunt Nell, paid us a visit, and we did some fishing. That was in June; it seemed to rain every day we went out and [we] didn't have much luck.

Another thing which happened while the youngsters were quite small, [they were] getting around pretty good. I guess they were ages, say, two, three—two, four, and five, or something like that. They were quite friendly with the Royle kids, who lived over across Washington Street and across the V & T main railroad tracks. And I've heard these kids say something about the "chookie-chook," and I didn't pay much attention to what they were talking about. And it happened several times, and one day, I heard the V & T whistle at the first crossing this side of Lakeview. The kids all heard it, and away they ran. I looked over there, and the Royle kids were there, too, and they all got down and put their ears on the rails to hear the "chookie-chook."

And they kept their ears there 'til the train wasn't more than a few hundred feet away. However, I guess they usually had had sense enough before, no doubt, to get away from that. But that was quite an experience, and I think Mrs. Royle and Ruth had quite a little session with the kids to break them of that habit. However, I'm sure they were in plain sight and the engineer would've put on his brakes and would have stopped the V & T, had it been necessary to do so.

Another thing which happened in those days, which might be mentioned, is Ruth's experience with lumbago and the event which apparently seemed to cure it. She was laid up with lumbago when the two oldest girls were respectively about four and two. And I think Elaine, the baby, was just a little baby in the crib. And, of course, I was away at work, and she was there on the couch, laid up with lumbago. The kids had their outdoors suits on, and presumably were out playing. They did play to some extent. But then they came into the house, and I think Ruth discovered this before I did. They had gotten into the flour barrel and poured water into it and made dough wads. It was all over the floor. We had some newly painted cabinets—newly made and newly painted. They found some of the orange paint and black paint I had been using in the bathroom and the utility room to decorate it, and the oldest girl decided that Joan, the youngest one, should have black hair. So she painted this enamel all over Joan's head. And the house was a mess. I don't know why kids get on a rampage like that, but they do it. That was the cure of Ruth's lumbago, at least temporarily. When she found out, she got right out of that bed, and I guess she forgot about her aching back. A little paddling took place, and then it was quite a chore to get that paint out of Joan's hair. It took quite a lot of doing. I don't remember all the details at the present time.

Another event which was rather interesting, we were not people who had liquor in the house, and we didn't serve liquor. Nevertheless, we were going to give a party and decided to have a punch. Our neighbor, Clara Crisler, was very good at that kind of thing, so we asked her advice, and I got the oranges and lemons and the other things to go into the fruit punch and prepared the juices. Clara said, "Well, now, punch isn't a punch unless it has a good stick in it."

"Well, all right."

Well, she had the sticks. She had both ruin and bourbon, and she might've had some gin; I don't know. But anyway, she put some pretty good sticks in the punch, and we got it home and had the party. Everybody was imbibing freely; the taste was not there. You couldn't tell there was any alcohol in it. But before the evening got too old, some of these people who thought they were getting a soft drink were completely out. Thereafter, they made no disparaging remarks about the Littles not serving anything with a stick in it.

Briefly, I should discuss some of my extracurricular activities, so to speak. I was always interested in minerals and mining and had spent much of my spare time trying to find gold or a good prospect. One time, Clarence Meginness and some of his friends had taken a trip up into the Sierras west of Carson to the old mine workings of the old Athens mine, and came back with a sample showing a little free gold. And Woodgate and Clarence and I all got interested, and we made a trip up there and took a sample of a small seam of quartz about an inch wide, and it assayed two hundred dollars a ton.

The Athens mine belonged to the Mullers, Chester Muller and his sisters. We made an arrangement with the Mullers to lease the property, with the specification that we work

it as we had time to do, and I think they were to get ten percent royalty on anything we took out.

We worked on this prospect. The old Athens workings were not intact; they may have been caved. But we found the ore was in these tiny veins, all lying parallel, and it was difficult to get the ore separated from the waste. It was also necessary to put many stulls in, timbers and some lagging, to hold the walls and the ceiling. Nevertheless, we did get probably several dozen sacksful of ore and took it up to the Silver City mill (Trimble's), and had it run through. And we got good results.

The following year, we did not have the time to do much of this, and it was during Depression years, and Mr. Fairley, my wife's father, had been relieved of his fruit job in Grand Junction on account of the depressing times. So he came out, and he and George Baxter worked up there for us for five dollars a day. Mr. Fairley was an experienced miner, having done some mining and leasing in Cripple Creek in his younger days. He and George followed the ore and produced quite a little more until it ran out. Then there was nothing else to do, according to my knowledge of the situation, but quit it. But altogether, we did get out enough ore (which averaged around sixty dollars to the ton) to make a little over five hundred dollars, I believe between five and six hundred dollars.

Woody Woodgate wanted to continue, but I couldn't see any percentage in putting money into it which I didn't have, in just looking for more ore. So we gave it up. Nevertheless, we had fun. We would go up there on weekends, and we'd take lunch. We would also haul wood back. The 1926 fire had burned a good many trees and damaged them. Yet they were good, and we were all using wood and coal stoves, so we probably spent as much time hauling

wood down in the old Dodge truck as we did on gold.

I might say that that Dodge truck was a revamped 1923 Dodge touring car. The old Dodges had a oddball gearshift, which was just the opposite to the other Dodges, but also had a tremendous amount of power in low gear. We found this car down at Woodfords. It was owned by an Indian, and we bought it for forty-five dollars, fixed it up a little bit, put new tires on it, and that was our transportation up and down that hill. We had to have a good, powerful car because there were some twenty-percent grades going up, and you needed the low gear, also, as a brake, in coming downhill. This was about the only time I really had any dividends at all from my mining operations. It was fun and a good experience.

Later on, George Meyers, a local merchant and former student of mine, took up the ground and bought it from the Mullers, and George owns it at this time. It was just the other day (this is 1971) when George asked me if he could have some of those specimens taken out by the old-timers in the early days, and he was making up a little case to display them. So what few specimens I had, I gave to George.

The old Athens mine produced some very rich ore in the early days, and it was milled in a two-stamp mill, which was right alongside the King's Canyon Creek, just above the old Osterman grade road. However, I believe that burned down or it was torn down at some time between 1926 and 1940. I know it has not been standing there for many years.

I think I should explain relationships of the laboratory with the different sections of the Highway Department, also explain further than I have already done relationships with government people, state, national, Bureau

of Public Roads, and with contractors, subcontractors, and dealers.

In the early days, of course, the Highway Department was organized in such a manner that a few department heads could fairly well handle all of the duties. As time went on, more money was made available, more roads were to be built, more problems developed, it was required that new assignments be made, with new titles and new subdivisions, and more people to carry them out. It was also noted that there were more assistants, that is, immediate assistants, under each department head, made in later years than there were in the beginning. I would like to say that when Bob Allen came in as Highway engineer, he was a good organizer, and he did create several new departments. I will also say this about Bob Allen—he helped us a very great deal in obtaining the new laboratory. He had come in just at that particular time, and he certainly was in favor of getting us housed where we could do better work and where our bad odors and noise didn't bother other people.

Now, to go on with the relationship of the testing and materials division with others in the department, first we might discuss the relationship with the equipment division, which was located in Reno. All equipment—that is, vehicles and excavating equipment used in maintenance, and equipment such as snowplows and even the small equipment, hand tools, or special equipment which could be made in the shop over there, was made there. We benefited considerably by having this equipment division. In the laboratory, itself, I have stated before that the equipment division made an evaporator for us in the testing of asphalts. This evaporator was designed by Mr. Morrison and built over there. Another piece of apparatus, which I have already mentioned, was the so-called

bottle wheel, whereby we could speed up the dissolving of soluble material in the soils in order to run chemical tests on them. And in later years, the equipment division outfitted the testing department with excavating equipment used in doing our prospecting. They also helped us, on two occasions, move from one building to the other. Our first move did not take too much effort because we had no large machinery, but as time went on, the laboratory was moved from the new building just finished in 1936, to quarters in the new Highway building southeast of the capitol building, and the heavy materials, heavy equipment, had to be moved in. And again, when we moved from that building to the new laboratory south of town, the equipment division was very helpful in taking down, moving, and putting back together this heavy machinery.

We also depended upon the equipment division to build field labs, mobile labs. This happened later on, but I can explain it now. It was found [to be] much easier to have a number of mobile laboratories which could be moved from one job to the other, rather than depending upon the contractor to build so-called test shacks, which often were dusty and drafty and unsatisfactory. Therefore, it was decided in later years that this should be done, and it was done. And we have—I believe, at the present time, there must be at least fifteen to twenty of these portable laboratories in existence.

As time went on, as I have stated, additions were made to the Highway Department in the way of districts—not districts so much as subdivisions of the main headquarters. Actually, the districts did increase to a total of six, which they have at the present time.

I think the next thing to discuss would be our relation with the right-of-way

department. The right-of-way department, of course, functioned very efficiently in securing agreements with owners of land, and securing rights of way, and dealing with the power companies, telephone companies, and other utilities regarding services which were interfered with when roads were built. But another important function was to tie up material deposits so that the state could have guaranteed use of material. This usually was done after the laboratory had made preliminary tests, and [if] it looked like a certain deposit, whether it were on government ground or private ground, had possibilities for use, the right-of-way department would make tentative arrangements to secure the material, or at least would find out sometimes who was the owner. That was not always possible to do in unsurveyed or poorly surveyed areas. So we had this relationship with the right-of-way department, and we furnished them sketches where actual measurements were taken between our test holes and measurements of the entire area developed for a materials source. This, then, they drew up to scale and secured use privileges.

In the early days, the materials on private ground was rather cheap to obtain. On federally owned grounds, we didn't have any royalty at all to pay. On the railroad ground, they charged us originally just, I believe, three or three and a half cents per cubic yard. Later, that went up to ten cents, and I believe it's even more than that at the present time. Private owners, farmers, ranchers, and others usually were given the same amount of royalty as given the railroad.

Another group, or section of the department, was the planning department, that is, the planning of future work based on traffic studies. This organization came into full being under Mr. Allen's administration, and W. T. Holcomb was placed in charge of

that, at first as simply head of the planning, and then finally as assistant state Highway engineer in charge of planning. The planning people made traffic studies and traffic counts, and eventually, the axle loads were measured. By extrapolating data into the future, it was possible to estimate with some accuracy the number and kinds of axle loads a certain section of road would receive in the future. Those were the times where we designed highways to meet not only present-day needs, but the needs for future traffic of, say, fifteen to twenty years ahead of time.

The laboratory was furnished data from these studies. We could then determine, by knowing the wheel loads required, the kind of materials and the thicknesses of the various base and surface materials required to withstand that kind of traffic. I will not go into the tests at this time, but that information from the planning survey was very important to us. Once that was obtained and all of our soil tests were in and our gravel tests were in, we could then set up roadbed designs to support the loads. And this information would then be transferred to the design department.

We had very close contact with the design people at all times, not only for the design of the types of pavement and the thickness for the various types of soil. For example, in going across a section of land perhaps ten miles long, there might be six or eight or even more kinds of soil, each of which would require a different treatment. These were determined, of course, by thorough sampling and testing, and then recommendations would be made to the design department about the design of the pavements.

And we also made chemical tests of many of the soils because in the Great Basin area, the common salts which ordinarily would be washed out of the soil and carried to the sea

were very often deposited in the low places and accumulated there, in accumulations severe enough to adversely affect concrete and metals. Therefore, it was necessary that the designers know what kind of materials to use in these places. If there were no bad effects, such as in decomposed granite hills, which contain very little aggressive chemicals, they could use standard, ordinary materials. Going through swamplands where it was necessary to put in drainage structures or building concrete structures and fencing materials over lands saturated with salts, very special materials had to be used. We did not always do the right thing, because at first, we did not know what was the right thing to do.

But, for example, if the aggressive salts, which were principally common salt, sodium chloride; or Glauber's salt, sodium sulfates; or common sodium carbonate, bicarbonates—when those salts were in concentrations, they would act as electrolytes, as well as acting directly on certain metals and on certain substances in concrete. Therefore, for the concrete materials, it was necessary to coat such materials on the outside with some impervious coating, or make the concrete out of a kind of cement which would be resistant. We did not have the information in the earlier days about cements, but that did develop, as years passed by, and we finally arrived at methods of doing this.

Corrugated metal pipe is used very extensively, and most of the states finally decided that in most cases, drainage pipe could be made out of corrugated metal, provided it was coated with an asphaltic compound which would adhere under practically all conditions. However, the real bad places, like sodium sulfate or common salt swamps, those kinds of places required further study. First, we started using

laminated redwood, which, of course, was not affected by the salts, although the nails would be affected, and rust out, and then we used vitrified clay pipe, which, of course, was inert. The trouble with vitrified clay, though, it was not always too good a material to use where the cover was shallow because it would not withstand shock. We eventually used reinforced concrete pipe in those areas, and in some cases, it was coated. But research done in our own laboratory indicated that well-made pipe would withstand a tremendous amount of action by alkali without being materially affected.

Thus design and the testing laboratory found it necessary to closely relate their findings, one to the other. We would have to get information from the design as to what they had tentatively planned. Then we could make our recommendations as to whether or not that type of design would work for the job.

The construction division finally became a separate division, and, of course, the testing under actual construction was one of the principal things that had to be done. The laboratory would make up for each contract, as it was let, a list of materials which the resident engineer and his crew would sample, and the approximate quantity or number of samples required, the kind of containers to use, and, of course, they were furnished with methods of sampling. This list was also sent, of course, to the district engineers, who had direct supervision of the resident engineers, and, of course, was also sent to the Bureau of Public Roads, who had overall supervision of the whole thing.

In addition, it was necessary in many cases to set up testing laboratories right on the job. This was done, as I have stated before, at first by requiring a contractor to build test shacks of certain dimension. These were equipped by the headquarters

laboratory with stoves and other drying materials, with the sample containers, with sieves, and finally, with sieve shakers, and eventually, with apparatus to do some of the simpler soil tests. As time went on, of course, construction equipment was improved to the point that construction took place very rapidly, and it was extremely important to get answers back to the contractor or back to the resident engineer as soon as possible. Therefore, instead of sending samples into the state headquarters, the simpler tests of significance were done right on the job so that the answers could be obtained as soon as possible.

The kinds of equipment these field labs contained has been explained previously, but it covered the routine tests made in the field on surfacing and base gravels, and also, on concrete, which principally consisted of making up concrete cylinders in the field. It was also necessary for someone from the laboratory to frequently visit the construction jobs as they progressed, to make sure that the testers and inspectors were doing things according to the way they were supposed to do them, and to help train new men on the job.

Of course, maintenance comes in on testing, too. There was some difficulty in the early days to get these people in charge of maintenance to get things tested before they used them. They had a tendency to go out and find some material and put it on the roads and make repairs without tests. This happened many times, and it probably was one of the worst features we had to contend with, was to really get those maintenance men to get samples in and approved before they were used on the road, especially of natural materials like gravels.

Of course, some other things happened there. I might mention one instance where the maintenance people did not bother

to cooperate with either the right-of-way department or the testing department. I recall when James Wallace, right-of-way engineer, and I were sent to deal with a sheep man who had taken up some government land near Fernley. This land contained a gravel deposit which the state had used, but, of course, after the sheep man had arranged to take it up, it was no longer available to us for free use, but it would be available under contract on a royalty basis. James and I went up to the hills and found the sheep band, so he wanted to know just where this area was; we took him out to the area, and this is the area, and then, to our surprise, here was about ten or twelve thousand cubic yards of gravel with a big sign on it, "Property of the State Highway Department." To say the least, James and I were embarrassed. The state ended up, of course, buying this material. A few examples like that helped to alleviate that kind of situation. So we did have contact with the maintenance people.

Auditing department, we were concerned and they were concerned with us. We had to make up a budget. Okaying of bills for equipment and supplies, of course, had to eventually wind up with the auditing department. There was a stockroom—that is, a stockroom usually in the main headquarters which handled paper and secretarial supplies, as well as common things like brooms, mops, and shovels, and some containers which are usable, even in the laboratory. So we had frequent contact with those people.

Then there was the reproduction department. Blueprints and photographers, at one time, were in the same department, but I think they were eventually separated. But there were occasions when we'd want a camera or we'd want someone to go and take pictures of certain areas, or take pictures of an experimental section as it was finished so

that studies could be made in later years to see just what had happened to that kind of thing. The reproduction department would also reproduce, for us, many of the maps, and so forth, which we [would] use and which we wanted to send to other people.

Then eventually there was a personnel department put in. Of course, we had to go through this personnel department, eventually, when the personnel system was actually installed by the legislature, in order to pick our new employees, or possibly to remove a few employees upon occasion. In other words, we had to go through the qualifications and personnel reports with the personnel people. We also, in later years, had to serve on examining boards for personnel we wanted to employ. I also was involved in other areas. Apparently, because I raised some whoppin' big cabbages one time, Mills thought I would be a pretty good landscape specialist. So, in hiring your landscape people, I had to serve on those boards. Some of my assistants aided me in this, and I requested some of them to sit in on these boards, although they did not take an active part. These boards usually consisted of one or two top executives and a department head, and maybe some others, sometimes legal personnel, or someone else. So we had frequent relations with personnel, -and the matter of raises, promotions, retirement all went through the personnel department.

The legal department, of course, came into being later on, and while we had very few direct contacts with the legal department, in much later years, in the sixties, a claims board was formed, and that was represented, of course, by the legal section, as well as the construction and testing and personnel, and of some of the others. So we did have an indirect relationship with the legal people.

Now, the landscape people, that seemed to be my forte, to get mixed up in that

thing for as long as I was in the Highway Department. There was a public relations department established by Mr. Allen, and while our relations were not frequent, there were infrequent discussions and meetings, especially with respect to some new project, or some special kinds of tests, so that some of these could be made public.

I think I've covered this in not too detailed a way, but it does show that we had to have a fairly close liaison with many of the central headquarters' divisions or subdivisions. Of course, we had direct relations at all times with the five or six divisions, with the division engineer. All tests and operations in the district had to be taken up with the district engineer, or at least he had to be informed of what was going on. And, of course, the district engineer, in turn, had direct supervision over the resident engineers, especially in the earlier days. Later on, when the construction department took that job over, the district engineers were left more to the matter of maintenance and public relations, and that kind of thing, because as the state grew and more utilities were put in and more people were building houses and buildings, manufacturing plants, and that kind of thing, public relations became a real chore to division engineers.

I'll discuss, to some extent, the relationship between the various contractors, and later on the subcontractors, dealers, and suppliers of material with the testing department. I think, first, I shall name some of the contractors, old-time, and some of which carried on through for quite a few years—at least I'll name those I can remember. There was Scott and Coolidge, who were in business before I went into the Highway Department. My first contact with one of their contracts was just east of Eureka in 1925, on the way back to Colorado for summer school. I think I

mentioned this before. They set off a charge ready to go, and not having much traffic, didn't worry about putting up signs. We saw the men waving their hands frantically, and did escape the blast. That, however, was discussed. That's about all Z can remember of Scott and Coolidge, except that in later years, when the partnership dissolved, Lee Scott became a state officer, I believe, in the public Service Commission, and, as a matter of fact, was a neighbor of mine.

Of course, the Isbell Construction people I knew from the years I was teaching school because C. V. Isbell's oldest boy, Bill, and his daughter, Myrtle, went to school to me. At that time I also became acquainted with some of the other Isbell people. Isbell['s] first job in Nevada was the Clear Creek job. They did very, very well on that job, as I recall, and their headquarters at that time was in Carson City.. Later on, of course, they purchased ground in Reno, and their headquarters were set up there, and they operated out of Reno until the road building-contracting business was finally dissolved in the sixties, I believe, late sixties.

Then there was King and Jones, who usually confined their work to paving. But they were at one time hooked up with Fredrickson and Westbrook, and King and Jones and Fredrickson and Westbrook were first known to me when they did the paving job from Carson City to Washoe Summit. I had good relations personally with these people because I was doing quite a lot of the field work in those days. And I'm sure Frank Morrison had very good relations with them. Our direct relations, though, really weren't any more than occasional—that is, with the prime contractors, for reasons I'll explain later.

Then there was George French, a contractor who had quite a few jobs in

Nevada. Union Paving—I've forgotten the name of the chief owner there, but he was a Scotchman, was quite a character and he was typically Scotch according to his reputation until he had enough Scotch in him, the liquid kind, to loosen up to some extent.

Then there was, of course, Dodge Construction (it started out as Dodge Brothers), and A. D. Drumm. Both Dodge and Drumm worked out of Fallon. Andy Drumm called his organization the Silver State Construction Company, finally. Andy was known statewide and on beyond the state borders as being quite a character.

Our relations with these contractors, as far as testing goes, as I say, was not always direct, but in some cases, it was. I'm going to mention one case with Andy Drumm which happened, I believe, in about the middle fifties or late fifties. Andy had a contract [on] the other side of Winnemucca, between Winnemucca and Battle Mountain. And we had designated a limestone quarry site, which Andy didn't like. He wanted to use another site which was closer to the job in which the rock was easier to work. And I went up there with some Bureau of Public Roads people and with the resident engineer, who happened to be Ace Howard, to sample. I could see that there was quite a little clay in the material, but the Bureau boys got hungry, so we decided to go up to Battle Mountain and have our lunch first.

When we came back, all of those clay seams had been carefully blown out with an air compressor. And nevertheless, I sampled it, and dug into the clay seams and got some of it out. Andy was pretty sore about that. He left and pouted the rest of the day. Nevertheless, we did use the material in part of that deposit and okayed it eventually. But fin] later years, Andy was a very good friend of mine; as far

as business was concerned, he was a pretty tough customer.

I recall, very much later, Andy Drumm secured a contract with the people who came out from the East to work the lithium deposits down near Silver Peak. And these people wanted huge open evaporating areas prepared so they could concentrate the lithium salts as much as possible before taking them up to the refining plant. And they wanted it done very rapidly, and they also wanted the bottom of these open evaporating places waterproofed so They wouldn't lose the valuable concentrate.

Andy called me, and I told him where to get the material because we had information right [by]; I also suggested a routine for asphalt-treating the thing. This was done as a public relations matter handled by the state Highway Department. I had permission to do it from Mr. Mills. And in addition to that, it was bringing in a new industry to the state. So I gave Drumm the information; he proceeded and got the job done on time. Ever after that time, I was a lifelong friend of Andy Drumm's. However, this was not my doing, so much as a public relations thing done by the state Highway Department.

Then there was the Utah Construction Company, which operated on many of the Nevada highway contracts in eastern and northern Nevada over the years. In fact, the Utah Construction Company owned considerable land in northeastern Nevada in Elko County.

There was Olaf Nelson, who did the first asphaltic concrete paving reconstruction on the Reno-Carson highway in 1930 or '31. And there was Nevada Rock and Sand, who—I think the lead man in that was [Frank] Frandsen of Reno. And there was J. N. Sumsion, contractor, and there was Hoops

Construction. Hoops owned land in, I believe, southern Elko County, and had done several state Highway contracts in that area and other areas of the state.

There were others whom I do not know. I do recall one contractor (I can't remember his name now), who had done some oiling for us in Nevada, and seemed to be very well satisfied with the test results we were obtaining in extracting the oil mix for him. The test results to him seemed to be very accurate. He obtained some kind of a job—I can't remember the nature of it now, but I believe it was some kind of an asphalt job in one of the eastern seaboard states. One day we got a long distance telephone call from him, that he was sending a sample of that material out for us to test because he had more faith in what we did than he did in the tests he was obtaining back there, which we did, without charge, as a public relations material. We thought the compliment was worth doing the test.

Of course, there are a number of smaller contractors who did some of the smaller jobs, or who subcontracted certain items from the major contractors whom I've just mentioned. George E. Miller of Reno did considerable contracting for the state, as well as for the City of Reno and various counties. Then there was Smith-Peterson and Company in Reno. Smith-Peterson started out, I believe, in the bricklaying business, but obtained the sand in the old Idlewild pit, and later on, obtained sand and gravel from the Truckee River areas in eastern Reno. Smith-Peterson furnished the aggregate for the Clark and Henry job, which was the first job on the Reno-Carson highway reconstruction, which was from Washoe Summit to Huffaker's.

I became very well acquainted with Peterson (I've forgotten what his first name

was), and with Mr. Kornmayer, who ran the gravel operation. There were never finer people anywhere than the Petersons. I also knew Mr. Smith, the father of "Tank" Smith, who later was mayor of Reno. Our personal relations were very good. I became very well acquainted with those people in the early testing we did in the contractor's test shack, where I broke in testers and inspectors for our first paving job.

Then there was J. N. Tedford of Fallon, who had several small contracts in the state. In fact, at one time I think he prepared gravel in many sections of the state for maintenance purposes. There were many other small contractors; their names I cannot remember just now. There was one in Lovelock, and there were some in Winnemucca. Their names may come to me later on.

However, before going on into the suppliers, I wish to make a statement about protocol, perhaps we'll call it, or ethics, in the matter of contacts between state Highway Department officials and contractors and subcontractors. First of all, some principal problems which might deal in legal or right-of-way or significant construction problems—those usually were discussed by the contractor or one of his head men directly, with one of the top officials of the state Highway Department, such as the assistant state Highway engineer, or with the Highway engineer, himself. Other problems which might arise in the course of a construction job of slightly minor significance could be handled on the job through the resident engineer in conjunction with his conferences with the district engineer, and all of which, regardless of where it was taken, whether to the district engineer or headquarters or resident engineer—all of these things also had to be gone over and approved by the Bureau of Public Roads, which, of course, was absolutely

necessary in a public land state like Nevada, where, say, around eighty-seven percent of the construction money was put up by the United States government.

Then there were some specific problems relating to materials or to structures or bridges, in which the testing department chief or assistant or the head bridge engineer might be called in. And those problems, where, if solved, or recommendations were made, they surely should be made through the resident engineer and the district engineer, and not directly by the testing department or bridge department with the contractor. That, of course, was a matter of, you might call it, protocol and ethics of approach.

There were occasions, however, where direct contacts were made purposely by a contractor with the testing department in discussing a material deposit or in discussing the use of a special material or trying to find out from the testing department where a special manufactured material which would do the job could be obtained. Those kind of things did not require any particular [laughing] protocol or involvement of other people, although the assistant state Highway engineers, and the Bureau of Public Roads were usually informed of whatever action was taken. In all these matters, of course, as I stated, the Bureau of Public Roads had to be contacted, and it was necessary that they agree, or sometimes they would make suggestions of their own which would satisfactorily solve a problem.

In speaking about relations, perhaps public relations or other relations with the contractors, there were often meetings, sort of general meetings called, in which a number of things could be discussed. This happened in the earlier days. In later years, a standard sort of meeting was prepared when a contract was let, called a preconstruction meeting, in which

a number of the people or subdivisions of a department were involved, and these various items were discussed by the contractor and the different sections involved. Particularly the construction department, sometimes the bridge department and often the testing department would also be involved in those.

Then there were other relations with the contractor of a different nature. It was the contractors' custom, through the Associated General Contractors each year, to put on a big spread, a banquet and a ball. Those usually were held in some big hotel or some area where a lot of people could be accommodated. And it was their custom to invite heads of departments, as a rule, and division engineers, and some of the resident engineers. Assistants to heads of departments were not always asked, but I managed to get into those because people like the Kornmayers and Smith-Petersons and others, who might've been the subcontractors, usually saw to it that some of us got into those. These meetings were presumed, no doubt, to foster and maintain good relationships between the contractors and the state Highway Department employees.

Another thing might be mentioned. For many years, it was a custom for any of the contractors to submit turkeys or some kind of a gift of some kind at Christmas. I don't believe many of us thought too much about that, but it was one of the things and we sort of appreciated it. But I'm very sure it made no particular difference as far as acceptance or rejection of good or bad materials was concerned. Nevertheless, the people outside of the department raised quite a hue and cry about that kind of thing, and I believe the time came (I've forgotten whose administration it was) where that kind of a thing was frowned on to the point where the contractors were requested to refrain from such actions. Nevertheless, as far as I was concerned, many

of us, we thought it was a nice thing to do. But regardless of that, Andy Drumm used to send us cantaloupes from Fallon almost every year.

There were many suppliers of materials used on state Highway contracts—that is, suppliers of manufactured materials. You could call gravels and various kinds of aggregates that, which were furnished sometimes by subcontractors. But in particular, I have reference to structural steel, for example, which, in most cases, had to come from back East or the Pacific coast. In mentioning structural steel, I might hesitate just a moment there and explain that.

Since there were no steelworks in Nevada, in the earlier days, at least, there were two things which usually had to be done, regardless. First, the mill test—that is, tests of the steel, the chemical analyses, and the physical tests of the steel at the time the steel was made—those tests had to be in the hands of the user, which was the state, and copies to the Bureau, and to the district and resident engineers.

Then the fabrication of the steel was not done where it was milled. The mill test might've come from Pittsburgh, and the fabrication might be done in Chicago, or it might be done in San Francisco, or somewhere else. The fabrication usually was inspected by an inspector hired by the state. This testing department was not in a position to send men from Nevada all over the country to inspect structural steel. Therefore, we hired a professional inspection agency, such as the Pittsburgh Testing Laboratory or the Robert W. Hunt Company, or others, to do this inspection. Usually, that included the mill tests, also, and these inspection agencies had authority to accept or reject the material on the basis of the specifications which usually were covered by the American Society for Testing Materials, ASTM. That

consists nowadays of about fifteen volumes of thousands and thousands and thousands of specifications for various (laughing) materials, or they were supposed to meet the American Association of State Highway Officials. But [for] things like structural steels the specifications in the ASTM were usually used, rather than the AASHTO.

Then other steel items, such as guardrail, were usually accepted on the basis of mill and fabrication tests, without the necessity of going through an inspection agency. Then there were small items, of course, such as castings. And some of those could be made locally, in Las Vegas or in Reno. Castings might be used in making frames and grates for drop inlets in drainage structures.

There used to be a foundry called the Galli Foundry in Reno, on East Fourth Street, and they made many of the castings used on state contracts. The raw materials they used usually were old automobile blocks, which made very good castings. There're a number of grades of castings. We specified a more or less medium grade, but the Galli Foundry product usually was of a grade much higher than that because of the nature of the raw material.

I must mention John Savage as a local contractor. John did some subcontracting, and he furnished the state with materials, usually sand or gravel or fill materials.

Then there were cements of various kinds, particularly Portland cement, and in several grades. These, until the advent of the Nevada Cement Company, had to be obtained out of the state, either from California or Utah. We accepted their mill tests, but we also ran confirmatory tests in our chemical and physical testing laboratories, both as to strength and analysis.

Timber products usually came from timber-bearing areas, Washington and Oregon, the Pacific Northwest in particular,

for structural timbers, Douglas fir and redwood. And occasionally, we would get timber for something like fence posts from the Southern states. Believe it or not, in spite of the long distance, some of the fencing materials came from Alabama, and Arkansas, and some of the other southern states. These items were inspected, or met the requirements of the West Coast Lumbermen's Association or the Redwood Association, or some other association which had standard grading rules. Our specifications were written to conform to the standard grading rules, and we always required certificates from the inspection agency involved before the timber could be used. Pilings, one timber item used considerably where heavy structures were to be constructed, especially over streams or over soft ground—. None of the timber testing was actually done by Nevada employees.

Corrugated metal pipe was accepted on the basis of samples, which were usually two and a quarter inches square, submitted by the pipe fabricator. These were tested for spelter coating, which is an impure zinc coating. And the requirements for that was two ounces per square foot. There's a very fast test which could be made on those. We would accept those tentatively. The pipe would be shipped on the basis of those tentative specifications. But final acceptance was based upon triangular pieces of the pipe taken at random here and there by the resident engineer or some of his assistants. These, again, were tested for spelter coating, and occasionally we'd run them through for the base metals. The impurities might be carbon, phosphorus, sulfur, and silica; and those four elements were usually run in a chemical laboratory.

Paints and preservatives were used considerably by the state Highway Department, paints especially on timber, except redwood, and on any timber guardrails

or timber structures which were not made from redwood. And, of course, the guardrail, the metal guardrail, itself, and structural steel had to have a prime coat of red lead paint. And then the second and third coats were specified usually with white lead or white lead-zinc oxide products. And these specifications were all very tight on that. We made frequent tests of paint. Sometimes, large quantities would be bought by maintenance, and we would require samples before the material could be bought. The state always furnished out of state funds the paint used in traffic striping. This was usually a big item every year. We not only tested paints, but before we would buy a paint—that is, we not only laboratory tested, we field tested by painting stripes, maybe as many as twenty or thirty or forty stripes, normal to the highway, that is, at right angles to the highway, across at least one lane of the highway. And we would watch it for a period of time to see the effects of traffic and would wash it off and observe the wear. Our bid would be based, usually, upon the choice from, say, the three best surface behavior.

Preservatives, such as creosote, of course, were used on timber, especially when the timber was untreated and would be placed underground. Timber which was entirely underwater did not have to be treated. Piling, used for bridges, did not have to be treated if the piling were entirely underwater and the foundations built over the piling. However, piling which protruded from the water did require creosote treatment. And there were specifications on this which had to deal with not only the kind of preservative, but the depth of penetration. And this was observed by our inspector, such as the Robert W. Hunt or Pittsburgh Testing Laboratory, or others.

Another item which had to be purchased, and which was used considerably in the early

days, was vitrified clay pipe. This usually came from the Pacific Coast from the Gladding-McBean Company. We had tests from them, but we also made random sampling[s] from shipments, and would test the pipe for two things, structural strength and for absorption. We had to make a special rig on our big testing machine in order to make the structural strength tests.

Then, later, the concrete pipe products came into being, and we found out by considerable research that concrete pipe, well made, with very few voids and with much tamping, or even with centrifugal force, that kind of pipe would withstand not only heavy loads and shock, but would also offer great resistance, regardless of the type of cement from which it was made, to aggressive action of certain soluble salts, particularly the sulfates. In later years, we specified that this pipe, when used in the so-called alkali swamp areas, or where there was a heavy concentration of salts, should be made from Type Five cement. This may be a little too technical to discuss here, but actually, we ended up with five types of cement. And this Type Five was a special cement which was low in a compound called tricalcium aluminate: if that were kept to less than five percent, there would be very little chance that the sulfate, the 504 radical, would act with the aluminum and make a swelling compound which would cause the concrete to break. So in later years, we specified Type Five cement for some of the pipe, and we also specified Type Five cement for use in concrete structures built on the job where the soil tests showed a high sulfate content.

We used concrete pipe in later years, and the volume became great enough so that a concrete pipe company, with headquarters at Yuba City, set up in Reno. I believe they called them the Nevada Concrete Pipe Company,

but I've forgotten now just what the name was at first. A young man by the name of Ted Wise was their head man in Reno, and the testing department['s] relations with Ted Wise [were] very good.

Now, the concrete pipe had to be tested, but usually, we had no means of doing it in the state. It takes a special machine, specially built. The concrete pipe company had its own machine in Reno, which could handle the smaller sizes, but it could not handle the larger sizes. And when those were to be tested, it had to be done over in Yuba City.

There was a structural strength test whereby a load was applied over a certain length of pipe, and continued application was made at a certain rate, until the first crack appeared. And so the pipe, once tested, was broken off for absorption tests, which were, of course, run in the Carson laboratory. Ted Wise and his company certainly were very helpful to us in that respect. I recall one trip I had with Ted Wise. It was a very interesting trip, and there was one little difficulty which I will explain later. But I rode with Ted from Reno to [Yuba City], and we tested these large size pipes over there. I observed the tests and took the notes and we were ready to approve them.

A fellow there in the agricultural business had used a lot of the product at a business about ten miles from there, and it was his wish that Ted and I go out there with him and observe how that pipe was doing and how it had been put in, which we gladly did. He had an airplane there, he said, so he took us out in a little three- or four-passenger plane, and I recall when he got over the point where he wanted us to look at the pipe, there was a small airfield down there. It seems that man just made a spiral like so [gesturing in a downward spiral motion], which I can describe with my finger, we got down there, and we landed. I

held my breath a good many times getting down there. Coming out wasn't so bad. But after he landed us back in Yuba City, he says, "Well, I'm doin' pretty good. I got my pilot's license day before yesterday." [Laughing]

One of the highway building materials, as a class, road oils and asphalts, was used in tremendous quantities in our state, as well as in most of the western states. Road oils and asphalts—these were purchased, as I've stated before, either in California or Utah, no asphaltic materials at that time being produced in Nevada. And we had very many meetings with asphalt people, not only on specification, but more or less scientific meetings, in which different technicians from the Asphalt Institute and from other state departments would discuss the use of asphalts and their relation to surface behavior and coating of aggregates and stability of mixes, and so forth. We had considerable relations, thus, with these asphalt people, with not only their technicians, but with their local salesmen and other salesmen. And through the years, we made very good friends with many of them. I like to think of Went Lovering, who has been with the Asphalt Institute ever since he quit the California state Highway Department. I presume, now, he's been there, at the present date, as much as possibly fifteen to twenty years. Went was a technical man working under Mr. Stanton, and later under Mr. Hveem, chiefs of the California highway materials lab. He was stationed as district lab head in the northern part of the state. And he knew very much about asphalts and their relationships. He'd taken many pictures. He had showed many movies and still pictures, slides, of asphalt construction. He would travel from state to state doing that in this western section, and would also put on programs in the different divisions in the state. All of these programs were very much educational,

and the maintenance men and construction engineers, resident engineers, and so forth, learned much from these programs put on by the Asphalt Institute, but particularly by Went Lovering.

Our relations with the asphalt people usually were good. However, in the earlier days, we had some problems. When the shipments were made by tank car—and sometimes water would get into the samples. But in later years, practically all shipments were made by truck and trailer— even then the sampling was difficult. We finally arrived at a means of sampling other than using the oil thief, whereby we could get what we thought would be a representative sample. However, there are always problems in sampling, even if you use the same people at all times to take the sample. However, personnel changes so much it is difficult to keep men trained for one particular job onto that job. If they're good men, they usually advance from that particular station to another rapidly.

I have mentioned relationships between the Bureau of Public Roads and the testing laboratory. The Bureau of Public Roads, in the beginning, did not have an official Nevada resident. They changed that in years later, and had a chief for the state. Earlier, a man by the name of E. C. Browne, who, I believe, lived in either Sacramento or San Francisco, visited the state often and took up the problems and reviewed plans, specifications, and procedures. As an assistant, he sometimes had the Bureau testing engineer, who covered both Nevada and California. A man by the name of Don Steele did this for some years. He was the Bureau of Public Roads testing engineer, and he came in and reviewed our specifications and our methods of procedure and equipment, and so forth.

Then we had relations, also, with many state and government agencies outside of the Highway Department, the U.S. Forest Service, for example, and the Bureau of Reclamation. We did considerable testing for both the Bureau of Reclamation and the Forest Service. However, the bulk of the Bureau of Reclamation testing was done in Sausalito, California, where there was a huge, well-equipped laboratory. But some of the simpler things, which could be handled by our laboratory, we did that for them. We also checked materials for the Indian Service. I think I have mentioned that before. And the Indian Service usually had an engineer. He would bring his gravels, in particular, and cylinders, and a few other items into our laboratory. We tested at a small remuneration.

We also tested for several of the state agencies, and did special work. Mr. Allen had a special project going during his years, in which he used Carl Gottschalk, our chemist, to assist, and we used the laboratory personnel take samples. This had to do with tests of waters in the Carson and Truckee rivers. I think it had something to do with impurities, because usually we tested the nitrogen content, which would be an indication of presence of organic matter in the waters. Samples were sent to us from the upper Carson, and samples were taken by the laboratory at Lahontan, and sometimes from the lower reaches of the Truckee River. This may have been done in connection with the state engineer of Water Resources, or it may have been done in connection with some private enterprise. I know that Mr. George Sanford seemed to be involved in this thing. We never did know for sure just why we were doing that, but it was one of our chores.

We sometimes investigated the foundation material for school buildings and other public buildings, took samples of the soils. We also

checked their concrete by taking cylinders. We may have perhaps checked their reinforcing steel and some of the other materials. We usually did this for just a nominal charge.

And as I have stated before, some of the large government construction projects, such as the construction of the Naval Ammunition Depot at Hawthorne and the Fallon Naval Air Station, both of those depended upon us for much of their testing in the early stages. As a matter of fact, one of their inspectors who used to bring samples in from the Naval Air Station at Fallon later became employed by the state, and is now chief inspector of concrete structures. His name is Al Palander.

We also had much correspondence with testing engineers of other states, especially those in the West. T. E. Stanton of California, followed by Francis Hveem, as chief testing engineer, and Levi Muir of Utah, and other testing engineers, New Mexico, Texas, Washington, Oregon, Idaho—all had problems similar to ours, and we corresponded considerably about the possibility of obtaining better tests.

The most research in producing testing equipment, I believe, was done by Francis Hveem of California. Hveem invented many, many workable and usable pieces of apparatus, and, of course, like any other inventor, many which did not work. But he's particularly noted for developing the Hveem stabilometer and several other items. The laboratory at the time it was under his supervision, also developed what is called a sand equivalent test, which more or less measures the quality of the finer materials in the sand and silt-clay sizes. This test has been a standard test, now, for a number of years, as has the Hveem stabilometer. Francis Hveem has been retired, now, for quite a number of years, and has done considerable private work in the Latin-American countries, especially in Mexico,

more or less educational work, teaching those people about the testing of certain materials, and how to use his apparatus.

We had so many of these problems that, occasionally, we would have local meetings. That is, western people would get together. All the testing engineers, state testing engineers in the United States, together, formed a general committee, testing committee, of the American Society of Testing Materials. This committee meets in Washington, D. C., every year. The Nevada state Highway Department was seldom, if ever, represented in any of these meetings, although the testing engineer served on several of the various committees. Mr. Morrison was on some of those committees for many years, and work in connection with that simply amounted to evaluating new tests and voting on whether or not to accept parts of the test, or the specification as a whole. In later years, as I will explain, I was able to take a few trips to Washington, D. C. when I was a testing engineer, and the relationship between all of the testing engineers in one meeting place, or as many of them who would attend, was interesting, and we had some very fine programs, and we learned a lot about what the other fellow was doing.

Prior to the beginning of World War II, or perhaps from the middle thirties, on through 'til about 1941, there was very much activity throughout the West, in particular, perhaps throughout the nation, in the building of highways. Mr. Allen, in his statement in the biennial report ending in 1938, mentioned that there was twenty-seven hundred miles of improved highways in the state which had to be maintained, and our money was so tight that it was a difficult thing to do. And raising the money to maintain [them], which had to be done from state funds only, was quite a problem.

It might be mentioned that during this period, which appeared to be one of haste to get these old dirt and gravel roads paved, that this probably had something to do with the final decline of the railroads (this is just my thought). The fact that we were improving these roads, making possible fast delivery, and delivery into isolated places by trucks, no doubt it affected the automotive industry. That is, more trucks were being built to handle this, and larger trucks and larger trucks, and the transfer of freight, and even passengers by buses to the highways, rather than the railroads, I believe, had quite an effect on the gradual decline of the railroads in this country.

As I look back on it at the present time, there seemed to be a rush to get these roads surfaced and maintained. The rush was of such nature, however, that some mistakes were made; they were bound to be made. I believe one mistake— rather, I don't know that I can call it a mistake, but the fact that our roads were quite narrow, even after they were oiled, say, eighteen to twenty feet, made some difference in shoulder maintenance. Shoulder maintenance seemed to be a terrifically difficult thing. The oiled surface would tend to break down right near that interface, between the gravel shoulder and the pavement. And this was not remedied 'til quite a few years later. We had Mr. Joe Meacham, who came into the department in the thirties, and later was made district engineer at Division Five in Tonopah, and even later, came in as construction engineer. And Joe pioneered in a theory that if the shoulders were partly paved, it would save money and maintenance and make smoother travel. And Joe developed this idea, and he tried it in a number of state projects as time went on. And finally, when the Bureau of Public Roads and the states put on a project at Malad [City], Idaho a number

of years later, one of the things they tried out was improving the shoulders. And this certainly confirmed Joe Meacham's idea. But Nevada, through Joe Meacham, pioneered in the building of shoulders, which resulted in lower maintenance cost and much better travel conditions for the public.

I make these statements which cover not only the time which I'm about to describe, but covered much of the time in the future.

The eleventh biennial report, which covered the period of July 1, 1936 to June thirtieth of 1938, probably covered the times of [the most] extensive activity in the Highway Department. Personnel had been increased all around, different kinds of jobs were assigned to different people, and, as I have stated previously, there was a great increase in trying to get all the roads surfaced as soon as possible, and as far as the money was available to do so. In this biennium, in looking over the personnel, our board of directors were the same as the previous biennium, Governor Kirman, Attorney General Mashburn, and the state controller, Schmidt. Most of the Highway officials were about the same; however, some changes were made. Mills, of course, was kept on as Assistant state Highway engineer, where he did a marvelous job in handling contractors' beefs, claims, and [laughs] some of the problems which the state Highway engineer was not always able to attend to himself. Mills was probably the chief assistant state Highway engineer, although the title did not so designate.

And at this biennium, there were four assistant state Highway engineers. Besides Mills, W. T. Holcomb was placed in charge of the planning department as assistant state Highway engineer. Arthur Loforth was placed in charge of construction as an assistant state Highway engineer. And August Berning, as an

assistant state Highway engineer, was placed in charge of field personnel.

The five divisions were headed as follows: J. M. Murphy, who replaced Berning in Division One; Hancock retained Division Two; Depp, Frank Depp, Division Three; C. C. Boyer, Division Four; and J. D. Meacham remained as head of Division Five. C. E. Wood was made a division engineer at that time. I don't recall what the purpose was. It may have [had] some political implications. But eventually, he took over C. C. Boyer's job at Ely. That will show, I think, in the next biennial report.

During this biennium, the laboratory was considered to be in pretty good shape, with the new building departmentalized as far as we could. There were, of course, some changes; new equipment in some places, was added, to some extent. And we increased the field crews, those crews who did the sampling work, to two. One crew took care of the soil sampling, and the other crew took care of most of the materials survey—that is, the prospecting for gravel pits. Most of the work had been done by hand heretofore, digging holes by handwork, pick and shovels.

During this biennium, we purchased a soils auger, and many of the soil samples were taken by boring holes in the subgrade with this soils auger. There were some questions, especially with the green man we placed on the job, about the validity of the sample and how it was represented. But if we had a good man in charge, that problem could be easily overcome.

Soils testing had become more and more important. In the former years, we had relied on a couple of simple tests called the field moisture equivalent and the lineal shrinkage test to classify our soils and indicate to us the need for gravels for base and type of surfacing. However, these were replaced over a period

of years, largely through research by the Bureau of Public Roads, who made quite a study of soils, and paid particular attention to the Swedish test called the Atterberg Limits. The Atterberg limits had to do with the sampling of soils for agricultural purpose. However, it was found they were adaptable, with modifications, to highway use. And the two principal things which were determined in these Atterberg tests were what is called the liquid and the plastic limit. Now, all soils are not plastic. But those which are plastic are known to contain clay. And soils which do not contain clay are not cohesive enough to roll out into a thread. So one general classification would be the soil is either plastic or nonplastic.

However, the Bureau of Public Roads study led to a classification system of these soils, in which they were grouped, according to these liquid limit and plasticity index characteristics, into what were called the A groups, A-1, A-2, A-3, A-4, A-5, and A-6. And there were some hybrid soils, we might call them, which would fall between an A-2 and an A-4 soil, which you might call an A-2-4 soil. That would depend upon the gradation and upon the nature of the plasticity index. It finally became quite certain that if the plasticity index exceeded six, you were beginning to get into a questionable soil. And when it got up into the twenties and thirties, it might be real questionable, especially if there was very much material passing the Number 200 sieve. Of course, it is known to soil scientists and to others that the plastic part of the soil is the very fine soil, the clay size, which is microscopic, or even submicroscopic, in case of colloidal soils.

By classifying these soils into these various groups, it was known that the A-1 soils and the A-2 soils were considered good. And A-3 soils were considered good. A-S

soil was just a pure sand. An A-2 soil was a mixture of sand and gravel and maybe some silt. An A-4 soil was one which is silty, and possibly a soil which would have a tendency to shrink to some extent. An A-5 soil would be a very fine soil which was not plastic, but which had bad expandable properties. Diatomaceous earth, for example, might be put into that classification. The A-C soils were those which had plastic clay and would produce great shrinkages. A-7 soils were those which contained plastic clay of such nature that the soil would swell with variations in moisture content. All these things were studied very thoroughly in many of the highway laboratories, and we did extensive work on these soils in the Nevada Highway lab. We finally worked out our own system, patterned very much after that adopted by the Bureau of Public Roads, as to classification of these soils, and use of that classification in order to enable us to reasonably design a roadbed with respect to the nature of the soil that had to carry the load of the roadbed, and with respect to the nature of the traffic which the roadbed would be subjected.

Now, it took more people in simply the laboratory to bring these factors together. The planning department was the department which made a study of the classified traffic, and in later years, were able to extrapolate data obtained over a period of years into the future so that we could design for perhaps as much as fifteen years ahead, rather than designing for what we have now. In these days, traffic was changing to such a great extent—that is, the loads were changing, and the volume of traffic was changing so rapidly that what we designed for today (which would probably be built in a year or two), would not be adequate to handle the loads even at that time. Therefore, it was essential that design be based on extrapolated data so that what we

build today would still take care of roads—or with the traffic, say, in another twelve or fifteen years.

Their thinking was very good, but, of course, there were always chances of mistakes. We found, for example, that a road we might think would carry nothing but low-travel, farm-to-market, or ranch-to-market, for over a period of great years, would, for some reason or other, suddenly become a high traffic road. I'll cite one example. This happened later in the year, probably in the 1950s. But it was decided to improve the road from U.S. 40 in the vicinity of Carlin, down to a point near Eureka, Nevada. And we also about that time, improved the road from U.S. 50, at a point east of Austin, down through the Manhattan area to Tonopah. We didn't expect any of these roads to carry very much traffic. However, we overlooked something which truckers did not overlook. Truckers carrying heavy loads try to avoid steep climbs or hills. Truckers who had been using the road from the agricultural regions of Idaho, around Twin Falls and Buhl, down to Los Angeles, they would go on down to Wells and on down through Ely, over Connors Pass, down through the area around Pioche, and on through to Las Vegas. However, there were some pretty bad hills in this region. They soon found out that by using the road from Carlin down to U.S. 50 and on to Tonopah, they were avoiding practically all of the hills, except some smaller ones. This put a load on the roads for which they were not designed, and, of course, many failures took place. This condition was corrected, as far as money would allow it to be corrected, over a period of some years. And as a matter of fact, I think there are still some more corrections to be made at the present time. I have mentioned some things about what had taken place in this particular period. I recall that the laboratory people in 1938-39 were

doing a lot of work in soils, and I believe we had about as many as three or four of those people working on soils most of the time. A few years later, a little fellow by the name of Johnny Curtis came into the laboratory. He had been an assemblyman from Washoe County. Johnny had but one arm. But the other arm and hand could do so many things. He was a mechanic, and he could fix a car to perfection, and he also learned to handle the soil tests, particularly the liquid limit P1 test (plasticity index) with that one hand. In determining the plasticity index, you would, of course, take the fine soil passing a Number 40 sieve; it would be moistened and worked on by adding moisture until what was called the approximate liquid limit was reached, and that was done by placing the soil in a small cup and cutting it with a grooving tool, and then counting the number of blows. This cup was mounted on a can with a handle. As you turned the crank, you would count the number of blows to close that groove for that particular moisture content as much as one inch along the groove. And you would do several tests doing that, and then draw up a graph. And where that line crossed the twenty-five-blow line on a logarithmic graph, that particular figure at that point would be called the liquid limit.

Now, in order to determine the plastic limit, the same sample, if it were plastic at all, would be rolled out. You attempted to roll them all, but some of them wouldn't roll; you simply called them "no plastic." You just gave the liquid limit value, and that was all. But if a soil were plastic, it would then have a tendency to roll out into a fine thread. And if it could be rolled out by hand over a glass plate which had been roughened into an eighth-inch thread, it was plastic, but how plastic? Well, the end point of that plastic limit was supposed to be the point at

which the sample, worked by the heat of the hand and by rolling, down to an eighth-inch thread, and then gathered and compressed into a more or less globular nodule again, and rerolled. Now, in the meantime, in this rolling and compressing, repeating that, the sample would gradually dry out in the air and by the heat of the hand. And finally, when that eighth-inch thread would just break in several places, and give away, that would be the end point. And that sample, at that point, would be picked up from the glass plate and placed between two watch glasses and weighed. After weighing, it would then be heated at a constant temperature until the sample did not change in weight. And that loss of weight, that percent of moisture, was always less than the moisture of the liquid limit. And whatever that moisture came out to be, say, twenty-one percent, that would be called the plastic limit.

But the critical area was the value between the plastic and liquid limits. So you would subtract the plastic limit value from the liquid limit value to get what was called the plasticity index. When that plasticity index did not exceed six, the soil was very definitely good. Should it be in the range between six and ten, the soil still could be pretty good, provided there was not very much of that minus-200 material, that is, that very fine material present. But if there were a lot of it present, it would not be a very good soil. This was all worked out mathematically, in a sense, so that we could put classifications down on these soils. However, it took a person quite a little while to practice on these things because there was so much about the test which was not strictly objective. It was, in some sense, quite a subjective test, and it was sometimes a little difficult for two or three or more operators to obtain the same result within a reasonable amount of variation. However, with practice and with attention of a supervisor given to

these people doing the work, it finally could be developed into a fairly accurate test. However, the longer you live, the more you know that there is really nothing perfect in this universe, but there's always an attempt to get as close a perfection as possible. And that is about the best you could do with a test of this kind.

We were [also] trying to find out if there were a relationship between certain test factors on asphalts and oils which would give us a clue to the nature and behavior of the oil. And we worked quite a lot in checking viscosity against asphalt content and other factors. And this was done by a series of statistical relations. I had had quite a lot of work in statistics in doing graduate work, and we applied a measure called the standard deviation and the Pierson coefficients of correlation. I had charts made up with which to do that, and we used to have quite a file on these statistical answers, but actually, we were unable to prove very much about them because of the great diversity of the nature of these asphalts coming from different fields and different refining processes. We really reached no general conclusions from that matter.

However, in doing some work in the Portland cement field, the statistical methods were invaluable. At one time, the Portland cement industry insisted on making high early-strength cements, and they also insisted that by using very careful methods in the tests, the strength of the cement at one to three days would be indicative of its quality and permanent strength. Therefore, I believe the cement company did a lot of research, but we took it upon ourselves (I think that was really my idea) to do some research on the matter.

We took the common Portland cement and made up the so-called tension briquettes, which usually were broken apart at seven days, and some at twenty-eight. But we made

up enough of them to be broken at one day (twenty-four hours), at three days, and at seven, and twenty-eight. And after trying many, tests of each cement, all of these data were gathered together (and I did this work personally in the wintertime when there was not much else to do), and got the data into tabular form so that statistical methods could be applied. And in applying the Pearson coefficients of correlation, it was definitely proved that the one-day test was absolutely worthless, and the three-day test was not much better. Therefore, for the regular Type one, standard cement, the most reliable tests for strength were very definitely the seven-day test, and, of course, the twenty-eight-day test. This information was never written up in documentary form, although the correspondence was handled through the department with other people and by word of mouth with cement salesmen; and soon, the idea of using the one-day test was given up entirely. However, in later years, a high early-strength cement was developed, which did develop a very good strength in three days, and for that particular cement, a three-day test as well as a seven-day test was specified. And, of course, a twenty-eight-day test could also be specified.

I think I mentioned earlier that another experiment was performed in the laboratory (as more or less of a research project), in which considerable silica was added to the cement. And we found that over a period of time, the strength of the high silica cement was greater than that of the common cements, and also, the heat of hydration was much less. This, however, was taken up before.

I think I should mention the personnel we had in the laboratory in this period, 1938-39, probably, on up to about 1940 or '41. There was Fred Davis, who was friendly

to the administration, and who had worked on highway and other construction projects. And Fred was a jolly fellow, and he was a good worker. And there was Mr. P. L. Woodgate, who had been a hotel clerk and a banker, but took very well to these laboratory procedures. You could always depend upon Woody for good work. Not only was he a good worker, but he was a reliable worker. There was Clarence Meginness, a good, reliable worker, who had been with us for some time, and finally, Melvin Ruedy came in as a chemist. Melvin Ruedy, I believe, had majored in chemistry at the University [of Nevada '36], and he came in and worked in the chem lab for a while. He was replaced in the chem lab by Mr. Carl Gottschalk, whom Mr. Allen brought in. I think Carl had come here originally to look at some mining properties. Carl had been a professor of chemistry at the University of Montana, and I think I have said before, he was a very good chemist, and had done quite a little research work, and was also an expert fly fisherman and a tier of flies.

Then we had Billy Robohm, who had been with the department for years. And while he was not an educated man, he would not vary one iota from a procedure. His work was always dependable. John Flournoy came into the department, I believe, about 1941, and John was placed in the asphalt division, as I recall. He became a valuable employee, but he left us after a few years and went with Billy Holcomb in the planning department. John and some of the other boys did some research.

There was Frank Garaventa, who came in along with Mr. Forbusch, to help prepare exhibits for the World's Fair. Mr. Allen was very much interested in that. And while there was no state agency specified to help do these things, these people who were employed by the state Highway Department, I presume you could put it down as a public relations

or—Nevada advertising situation, rather than anything that had to do with highways. But Garaventa was quite a man with rocks. He had studied rocks and minerals all his life, and he knew where they were found in the state, and he also knew collectors. Mr. Forbusch was very artistic in carving, and he had done considerable work with manzanita wood. And those two men were kept in the back end of the laboratory there, and they prepared quite a number of exhibits for the World's Fair.

Lapidary tools were used by Garaventa in both cutting these stones, and in polishing. Morrison became quite interested in it, and when he had any spare time, he would use these tools to make a few specimens of his own. Morrison was interested in many things in nature, not only minerals, but he was interested in the history of mining camps and history of timber, sawmills; he was interested in flowers and growing things. He had had a great interest in many things of nature. Unfortunately, he was handicapped by his hearing. Nevertheless, he did spend much time in accumulating these things, and as I've said before, he did a marvelous job of compiling weather data in his spare time.

James Goldsworthy, whom I believe was friendly with the Allen family, was put on as an additional assistant testing engineer, but we placed Goldsworthy out in the field. He actually was a mining man; he'd done very much mining, so he was placed in the field in charge of the gravel pit part of the materials survey. He had one helper, and after a few years, we gave up the handwork and finally put in a small backhoe to do this work. But in Goldsworthy's day, I think most of the holes were still done by hand. He usually had one steady man, and perhaps he would pick up two or three laborers in the area he was working on.

This materials survey we considered to be very important. It was important to know—at least, we thought so—important for the contractor to know, exactly where he could get good gravels, and exactly where other things were available, such as water (we furnished that information when we could). Also, he should know about the availability of borrow materials, where long flat places were to be filled, and there was not good soil to do it with unless it were hauled from a borrow pit. All these things had to be prospected fairly well and write-ups made, and those write-ups and diagrams and maps were placed right in the special provisions which were furnished each contractor. Therefore, this materials survey situation was really an important one, and the men in charge of it had quite a responsibility. That is not saying that they always carried out their responsibility as well as they should, but they made a pretty good stab at it, as a rule.

Mr. McLain, Dick McLain, I think I described before. He was a man who had done this materials survey quite a lot, and he was kept on. Dick developed some kind of bad habits in later years which caused us to sometimes question his veracity, but nevertheless, he was kept on for quite a little while.

Several college students would work for us in the summertime, and some of them, for financial reasons, would probably work on through another full year. One boy by the name of Richard Taw was very good help. He worked with us for a while, and finally went on to become an M.D. And there's Norman Noteware, of course, who came to us out of high school in 1932 and stayed for two or three years until I convinced him to attend the College of the Pacific, which Norman did, became a chemist, and worked for the Standard Oil Company for some little time. Then he came back to us July 1, 1942, because

at that time his mother and father were both invalids, so to speak, the father being a very, very old man, and Mrs. Noteware, who had been a teacher, became paralyzed. And it was necessary for Norman and his bride to come back to Carson City and care for those old folks, which they did, until both of them passed away, which was several years later. And Norman stayed with us on through and is working at the Highway Department at the present time, although he did take off for a few years due to a nervous condition, during which time he and his wife opened up sort of a family restaurant where they served chicken dinners in their home. But Norman came back to the laboratory and is still working there at the present time.

Norman's work in those early days was almost perfect. He came back to us as a chemist, and then he went into the asphalts, and then into other work. His health was not always good, which gave him sort of a handicap.

A boy by the name of Gene Robens was brought in about 1937. And Gene was a typist. About that time, Miss Phelan had left the department, and we had gone without a typist for some little time, and Gene took over the typist's job from July, 1937 to July, 1938, and then he was transferred out into the laboratory. Incidentally, Gene was quite an athletic type. He had come from Toledo, Ohio. He was a football star one of the Toledo high schools. And his coach was the coach who coached at Nevada during the big football years when Nevada had the semiprofessional teams. Jim Aiken was brought to Nevada through the work of Gene Robens. Gene promoted Jim Aiken to the point where he was hired as the Nevada coach, and he was the man that brought the famous football team to Nevada, but which eventually had to be disbanded on account of cost and criticism,

and so forth. Gene was quite a promoter. We inveigled Gene into joining the National Guard, which I shall discuss a little later on. He did so, took the correspondence courses, passed, and during World War II, went right into the Army and ended up on Eisenhower's staff, I believe as a lieutenant colonel or a major, and came back to this country after the war in charge of some big base. Gene had a handicap, a handicap in speech, but that did not handicap him in any way, as far as advancement was concerned.

Of course, Jim Sullivan came with us. I believe Jim came in about 1941 as a graduate from the University of Nevada. And Jim is still in the Highway Department. He was my assistant for many years. Jim did quite a little field work, and he did quite a lot of the testing in the oil labs and in the soil labs, had been through the whole thing. However, during the war, he was in the service. Then right shortly after the war, his father, who had run a cigar store—his father was a doctor in Reno. I believe it was his uncle who had run this cigar store in Reno, and Jim took that over and operated it for about five years, then came back to the Highway Department. Jim had one brother who worked with either the Journal or Gazette for many years, and another, Lawson [Sullivan], who worked in state departments, and I'm not sure whether he had a fourth brother or not.

We were sometimes given people who weren't the best in the world, as far as help was concerned. Bob Ducker came into the laboratory and was present for quite a little time. But Bob didn't always take to work in an amenable manner. He did the best he could with what he had to do, but that wasn't always very good. Bob became very angry at me at one time because I had the boys purchase brushes to place some asphaltic material on the main building steps, which were slippery,

and this asphaltic material, of course, would more or less make them proof against the slipperiness. And Bob secured a brush with an extra long handle so he wouldn't have to stoop over. Sent him back with it, and he didn't like that very well, and quit. Well, later on, Bob came back into the Highway Department, I believe as a watchman, or something of the kind, down at the maintenance shop. As far as I know, he's still with the department in that capacity.

We had another man by the name of Krebs, Perry Krebs, who, unfortunately, was unable to control himself under certain circumstances. He seemed to have a lapse of memory. He worked fine while he had his mind on what he was doing, but all of a sudden, he would lose track of what he was doing and would be almost helpless until someone would come and put him back on the track again.

Patrick Sanford came in as an assistant in the laboratory, but unfortunately, Pat had an automobile accident as a young man while he was attending college, and had been unconscious for many, many weeks; perhaps it was several months. When he came out of it, he was never his normal self again. He'd lost a lot of his motor control and was unable to control his actions. He walked with a rather jerky gait. And when he handled himself, it was with anything but smooth, uniform movements. He would lose control of the movement of his arms. We tried to have him weigh things out, but it was almost impossible to let him do that because his hand would suddenly touch the balance and cause it to vibrate to the point where he never could get a weight on it. We kept him around, and he helped us do some of the menial things, such as shovel snow off the roof in the wintertime, and do some other things. But Pat was not a hundred percent mentally right at the time,

either. We kept these kind of people in. In those days, there was no such thing as a personnel system, and so we put up with some people who probably should not have been there in the first place.

This laboratory bunch was consistently jokers, joke players. I have had a few jokes played on me. I recall one in particular. I was to make a trip to Las Vegas, and I was to leave the laboratory with other people, so I packed my suitcase and left it in the laboratory. At the time my car arrived, two or three of the fellows were very solicitous, "Let us carry that, Prof." So I conceded. They put the suitcase in the car. When I arrived in Las Vegas, I tried to pull it out of the car. I could hardly lift it. When I did get it open, they had it half filled with, tested reinforcing bars, or probably thirty pounds of steel in that, just [laughing].

I recall another time when these jokers had something backfire on them. In those days, there was a little play bomb you could attach to the ignition of an automobile, and if a person got in the car and stepped on the starter, this thing would smoke and wheeze and whistle, and you usually could cause quite a lot of concern to the uninitiated, thinking something was really radically wrong with his car.

A young fellow by the name of Johnny Dennison worked over in the main drafting room. And Johnny Dennison and Melvin Ruedy and Dick Taw would play jokes on one another. And outside of the laboratory one day, there was parked a car. It was assumed to be Johnny Dennison's car—at least, that's what Melvin Ruedy and Dick Taw thought. So they were out there in the process of rigging up the bomb on it—had it just about done when along came Reverend Kean, of the Episcopal, accompanied by one of his parishioners by the name of Mrs. Wood. Several of us, of course, were looking out the window to see what was

going on. And Reverend Kean said to Dick Taw, "What are you doing with my car?"

And I remember Dick Taw had kind of a florid complexion anyway, but I remember how extremely red his face became when he was accosted by Reverend Kean. So, of course, Ruedy and Dick disconnected the bomb and moved it off.

Well, in the meantime, Ernest Pohl and some of the others had been looking out of the main building window and had seen the same procedure. And phone calls came for Taw, and another one for Ruedy, presumably from the sheriff's office. And those two fellows were sweating blood there for some time because they thought at any minute they would have to go to jail. However, the whole thing was a hoax that backfired on [them]. I simply mention that as one of the sort of interesting things that happen in an organization like the Highway Department.

For many years, when we were not too large, we had a lot of fun in that way, most of it harmless fun. We would also do some rather nice things. Once in a while, we would get a fishing party together, and a gang of us would go up the East Carson River for a fishing excursion. It wasn't always fishing. There was usually plenty to eat there and plenty to drink, and plenty of fun. But as the department became larger and larger, those things, even these Highway picnics, so-called, were finally abandoned because there were just too many people.

Everett Harris, who later became Professor Harris, was also quite a joke player, and usually when they had the Highway picnic, I recall that he was custodian of the beer barrel, the beer dispenser. Everett was quite a character. He and Melvin Ruedy had quite some experiences together, and I recall some of their exchange of information on their

dates, and so forth. They were a couple of pretty good characters in those days! Later on, of course, Everett became the dignified professor at the University of Nevada, and I've had several meetings with him since that time.

One thing Everett did which was interesting, he was always interested in scientific things, and we had a very fine research microscope in the laboratory, and I found some diatomaceous earth, and Everett was immediately interested. And he and I managed to separate some of the diatoms, from the soil and other things it was mixed with. And Everett finally decided he would make out a little project on that thing. So he worked very patiently with this tedious matter of separating some of those diatoms out, but he did it to perfection, and made a number of slides. The skeleton of the diatomaceous earth is simply siliceous skeletons of the single-celled animals which [at] one time inhabited those skeletons. There are different varieties with long projections on them, and some that looked like screens and cross sections, and some are round, and some are different shapes. Everett made a number of slides out of those, and then he would go around from place to place upon invitation and give lectures on the diatoms and show the slides. It made a very interesting thing for a party, and I recall at one time he came to our house, and we invited a number of our friends.

Everett was interested in those kind of things. Another thing that Everett could do, he was an expert mathematician. If we had a problem which needed some advanced calculus, or something like that, we could rely upon Everett to get the problem solved. I recall a tank problem. Tank formulas sometimes are difficult. If you want to make a measuring stick for a cylindrical tank which is placed in a horizontal position or on a slant, the accuracy of the gallonage on that will depend upon, of

course the shape of the tank. And it's a little problem in calculus. Everett figured those out and made up the charts, which are still used to this day, as I recall, in the Highway Department.

Pure statistics are not too interesting. However, for this biennial report, and possibly one more, I will read off a list of the testing categories, in the main categories, at least, and the number of tests performed in the biennium. In this particular biennium, of course, more emphasis was placed on some of the soils. Actually, the testing that we'd count included a number of tests made in the field. Later, that had to be discontinued because there were so many field tests and field labs that that really was a separate thing, more in the nature of construction testing than pure lab testing. In this biennium 1936-38, there were 3,597 concrete materials, most of which were concrete cylinders, Of course, that included the various aggregates and cements, too. And there was 1,898 metals; surfacing, base, and fill materials—1,992; physical tests only on soils—1,933; and there were 1,327 samples of bituminous materials and asphalts; and 23 samples of asphaltic concrete mixes for extraction. Chemical analyses of various things, there were 1,568 of those. There were field tests at paving plants—321; then a number of miscellaneous items which were really too numerous to classify separately—1,069; making a grand total of 13,720 tests. Now, in talking about bituminous tests or concrete material tests, I believe what I've called tests, I should have said samples. Those were the number of samples tested, rather than the number of tests, because one sample might be subjected to as many as two to six separate, individual tests, and some are quite time consuming. Nevertheless, this did show quite a little increase.

During this period a number of field trips were made by me, as well as by Mr. Morrison. Mr. Morrison, due to his handicap of hearing, was somewhat reluctant to get outside of his own state, where he did not know the people. And he said that when he was in a crowd with a number of people talking from many directions, he was unable to ferret out one conversation from another. So he did not make many trips outside of the state. Those were left up to me pretty much.

I recall some trips in the state which were highly interesting. While Dutch Berning was district engineer at Las Vegas, I was on one trip there where Dutch spent quite a little time with all of us who were in this particular group going through Boulder Dam, both the construction of it, and through the powerhouse, which was being built at that time on the Arizona side. This was the only time I went clear through Boulder Dam. We were also very highly interested in the way the cooling was done. In spite of the fact that a low heat of hydration cement was used (I have discussed this before), it was necessary that piping was placed right in the concrete with water run through the piping, while the concrete was setting and giving off heat in order to cool it. Had it not been done, the expansion by the heat generated in massive concrete that way would tend to crack the concrete.

I have mentioned that we had a young fellow by the name of Gene Robens in the laboratory who did the typing for a year or so, and then he was placed out into the laboratory, doing other work, and Mary Rochon was transferred into the laboratory as a stenographer, typist, and clerk. Nary had been in charge, I believe, of some -section of the state government. I think it had had to do with automobile registration. But in change of politics, Mary lost out, and that

was good fortune for the lab, because she was an excellent office girl. She was excellent in the typing, taking shorthand, and keeping the files up. We never had a more efficient girl than Mary in the laboratory. And she stayed with us until she was transferred over to the main office. She came in July of 1938 and continued in the laboratory until January 1944, although for a time, she was loaned to the state controller for a three-month period in 1943. Mary was very efficient, as I said, and she also helped considerably in the standard specifications, which came out in, I believe it was 1946. Frank Morrison did much on those 1946 specifications. He wrote practically the whole thing. He dictated a lot of it to Mary Rochon during the winter months when things were not so active testwise.

I was invited by Mr. Allen to accompany him and some of his department heads on several long trips. Two I distinctly remember, and they were two which I enjoyed tremendously. One was a trip to Santa Fe, New Mexico for a Western Association of State Highway Officials convention in 1940. This was held in the late spring of 1940, and there were two carloads of us who left Carson City, and I believe this delegation was made up of the following: Mr. Allen, the state Highway engineer; George Egan, who was, I believe, engineer of design at the time; and there was Mr. Boardman, Edgar Boardman; C. E. Wood; Billy Holcomb, assistant state Highway engineer; and Mr. Swinburne, the architect; and Little, L. W.

On this trip we, as I recall, went through Death Valley for two purposes, the main one being to examine the possibility of improving the road out of Beatty into Death Valley, and we also went on down through the valley to Furnace Creek Inn, and on out to Las Vegas. We left Las Vegas and stopped momentarily at Boulder Dam, then continued, via the Grand

Canyon, into Arizona and New Mexico, and we stopped over at the Grand Canyon at one of the sight-seeing points. I have snapshots of that trip. We got down into Flagstaff, Arizona (I believe it was in April), and ran into about a foot of snow and cold. The following day, we got into the banana belt of Arizona, and went on down into New Mexico through Albuquerque and on up to Santa Fe. Santa Fe is quite a lot higher than Albuquerque, and their climate is a little different.

This meeting was very interesting. Many of the subjects that were pertinent at that time were discussed. I had a part in some of the discussion, and we had many good papers from Bureau of Public Roads people and other western people. I became very well acquainted with Mr. Campbell, the head testing engineer of the state of New Mexico. And one day when we didn't particularly like the program that was on the agenda, we decided to go back to Albuquerque and visit his laboratory. His laboratory was down there. So we went down to Albuquerque that day and visited this laboratory, which had been a portion of the university laboratory, and there was a balcony all around. In the middle was a great open space with an extremely high ceiling. He had his testing machinery down there, and he had some experiments set up, which, to me and to everyone else who viewed them, were very interesting and significant. He had obtained a number of resonance tubes, which are glass tubes, probably about two inches in diameter, and some of them as long as six or eight feet. He had placed soils of various kinds and of various gradations in those resonance tubes, compacted the soils, and stood them in water. And in some areas, he would place a waterproofing material between the soils in the resonance tube. And the capillary action was measured after certain time intervals. And from that study, it was possible to

evaluate soils with respect to their quality in presence of a continuous supply of moisture. For example, should a highway be built across a spring area or an area which was moist part of the year, and a continuous supply of moisture were available to the soil, if it were a poor soil, a capillary soil, it would bring the water up into the base and surface and cause trouble. In those kind of cases, of course, the thing to do would be to import a coarse-grain soil or crushed rock or something else to use in the base to prevent that capillary action coming up and causing trouble. Water is probably the principal, natural element to cause trouble in soils for construction use, highways or otherwise.

After leaving the area, we went through Colorado, and Bob Allen wanted to visit his relatives in Pueblo. As I recall, he was born and raised in that part of the [country], in Colorado. That was fine with me because that gave me a chance to stop off at Salida, Colorado and travel on over to the Gunnison country to have a few days' visit with my parents. I particularly enjoyed this visit. It was the last time I was able to visit with my mother when she was conscious enough to really converse with me. She had a bad case of arthritis, and later developed heart trouble. As a matter of fact, she passed away in 1942. So this was the last time I was able to see my mother in a condition where she could converse with me and we could tell each other our problems and our experiences. We left Colorado and returned back to Carson. I believe we were gone possibly about as long as two weeks on this particular trip.

Another fine trip that I had with Bob Allen and some of the Highway engineers was attendance at the Western Association of State Highway Officials at Seattle, Washington. I'm at a loss to find just what year that was. I don't recall whether it was 1939 or 1941, but it was

in the fall of the year. I have an idea it may have been in 1939, because in the fall of 1941, it was getting right close to Pearl Harbor Day, and I don't know that that was the case. At any rate, we left Carson City and went up through Oregon. As I recall, we went on up through Alturas, California and on up through Bend, Oregon, where we were so surprised to see so much of the countryside made of pumice, yet the pine trees seemed to grow in it. And we went inland, then, through to Portland, and stopped into Portland, and I'll never forget the oyster stew we had that was made from those little oysters they get up in the Sound. There was a fellow with one of the oil companies who treated us to dinner that night.

We also took a trip up a mesa, on the summit of which was, I believe, a Catholic school and an extra fine Catholic church. Bob Allen, being a devout Catholic, was very interested in those things, but it was interesting to all of us. We went up this cliff, as I call it, in an elevator. I also had a chance to visit briefly with Mrs. Little's aunt and uncle, who lived in Portland.

We left Portland, went on up through—I've forgotten now whether we went through Salem or not. But anyway, we went on up through the state of Washington, in the interior, to Seattle, where we attended the meeting. I recall that Bill Holcomb and I made up a Rotary meeting at the time. I believe it was held one of those days that we were in Seattle. I took some part in the discussions, and I've forgotten who it was, but I inveigled one of our number to go with me across the Sound to the plant of the Bethlehem Steel Company. I had never been in a steel plant of that kind, and we visited the pouring of reinforcing bars and the making of ingots for other purposes. That was highly interesting to me.

Also, I was given the treat by friends who read in the paper that I was one of the members up there from Nevada. These friends [were] Mr. and Mrs. George, George being the last name. Mrs. George was known as Laura Harvey in Carson City. She was a teacher here. I believe she taught Latin and history at the time I was teaching in Carson High School, and she lived next door to us in Carson, very fine lady. She and Mr. George picked me up one day and took me for a ride up in the heights around Seattle, and I had dinner with them. This was a very pleasant occasion.

Upon our return from this convention, we went down the coast area to look over some of the fine bridgework. Another thing we did, by the way, one of those days, was to cross Lake Washington on the floating bridge. Richard Barber, who was a Carson City boy, was one of the resident engineers on that job. And we let the rest of the several state delegates get out of the way, and after they were out of the way, Richard took us down into the workings of that floating bridge, which showed the machinery required to move certain sections apart to let ships and ocean-going traffic through.

We also visited the locks on the canal connecting Lake Washington with the Pacific, and we saw the barges come through, and we saw loads of lumber go through. We also visited the bridge across the narrows, the famous bridge which the wind finally blew down. The bridge was constructed in such a manner that the harmonic motion was not disturbed enough, so that when the wind blew at a certain velocity, the bridge vibrated, and it finally did go down, and I believe a few lives were taken along with it. We went across it before this had happened.

On our way down the Oregon coast, we visited some of the large bridges there, then

came on back through the interior and got down into California and visited the big dam on the upper Sacramento River, and came on home. This was a very splendid as well as an educational trip.

In the mid-thirties, during the Depression time, or recovery from Depression, the government tried to help out in the best way it could—by patting people to work, and the three-letter organizations PWA and WPA came into being. And the state highway departments, among other agencies, were, of course, asked to participate in this matter; and I recall, in particular, about that time, two projects which were Works Progress Administration [projects]. Now, those projects were transferred into federal aid highway construction projects. The Geiger Grade job needed redoing. The old Geiger Grade going from Washoe Valley up into Virginia City was an extremely dangerous road (with extra steep grades), and plans had been made to build a new highway. It was decided to make this a hand-labor job as much as possible in order to put more men to work. And I recall the teams and the men working on that grade reverting back to the old type of hand labor that was done in building the old horse and buggy roads years ago. I was reminded because I, myself, did some work in the early twenties on the old roads, up Quartz Creek in Gunnison County, Colorado, where I drove a team of black mares and hauled gravel in a wagon. And I recall how little I really accomplished, although I thought I was doing something at the time. This WPA thing reminded me of that, and it also brings to mind the comparison between that kind of work and the volume of work accomplished as against that accomplished by the huge machines and equipment of modern times.

I recall on Geiger Grade, Carl Springmeyer was the resident engineer, and I had gone up there several times to discuss things with Carl.

And in one place I recall, there seemed to be as many as twenty or thirty men hand-grading. Of course, they used some equipment; they had to do that. And blasting had to be done in the usual manner.

Then again, a little later on, we put in an asphaltic concrete job between the Reno-Purdy road, as we called it, which was [Highway] 395, Reno north, toward the California line. I recall that the gravel production for the asphalt plant [used] teams and fresnos and slips to pull the gravel out of the pit up to a place where it could be transferred into the crusher, and so forth. This was all done, and it reminded me of the old days. Then I think about what has happened since that time. In the early forties, I think that was the beginning of the boom in modern equipment and construction methods. Right after World War I, the state highway departments were furnished with leftover equipment—the old-time trucks and grading equipment used in the world war. And those trucks did not haul much; they didn't have as much power. I recall in the early forties, the trucks were capable of hauling from five to seven or eight cubic yards of gravel to a load, as compared to possibly three or four yards with the older trucks. This was all an evolution going on. Then the old-time blades used on the road were narrow things of low capacity, and the modern blades came into being. Then the 'dozers came into being, which revolutionized work, the 'dozers, and then the work of Le Tourneau in producing the carryalls, as they called them. The real modern carryalls are huge affairs which can move many, many yards of earth in one load. All of this came to mind when I was thinking back on the kind of construction work we did during that Depression period. It was slow and tedious, but it did get done, and it did offer men work. They were doing something more than just raking leaves.

The earlier crushing plants had low capacity—that is, the gravel-crushing plants. And the earlier "hot plants," as we called them, were a preparation of asphaltic concrete from the gravel by mixing the gravel with hot asphalts. Those were rather low capacity, and the plants were not as safe for the workmen as they were made to be safe later on. And the sampling that had to be done at the plant was somewhat difficult and, well, let's call it a rather primitive method in those days. Later on, as time went on, the plants were equipped so that sampling could be done in much better fashion. I recall the first hot plants that we sampled. We usually tied a frying pan to the end of a long stick and shoved that frying pan in under the bins as the different sizes of gravel would come down into the mixing hopper. Later on, provision was made to sample in a different manner. However, we did get the samples, and regardless of the fact [that] they were somewhat awkward in doing it, they were fairly representative.

In turning to the biennium, the twelfth, July first of 1938 to June 30, 1940, speaking first of the department in which I worked, the testing, one thing that we did at that time was to establish, or attempt to establish, a design for the load-carrying capacity of the road, the base and surface, based on the newer soil tests and the modifications of design charts set up by the Bureau of Public Roads. I explained the Atterberg limits earlier, and the Atterberg limits were used chiefly in this design of the roadbed on the basis of the soil and borrow tests. Of course, where the highways were built over long, flat areas where it was not practicable to pick up earth along the side and move it over to build up the grade on account of producing water ponds, and so forth, it was necessary to use what we call "borrow." Borrow is a material which was tested and approved. We tried to get as good

quality material as we could by hauling it from some designated area out to the road. Now, the same tests were applied to this borrow as were applied to the original subgrades so that we could not always bank on our soil tests in the design. Often, the design had to be changed on the job because of bringing in soil from some other source as borrow, which was probably not properly figured on in the first place. However, in most cases, the designers would know how much borrow they would need, and the lab could go out and prospect for and designate the better borrow sources.

The personnel in the Highway Department of 1939-1940 consisted of the following (there were some changes, of course, in the personnel): the board directors had one change. Carville came in as governor, and he was chairman of the board. He replaced Governor Kirman. And Gray Mashburn and Henry Schmidt, the attorney general and state controller, respectively, continued. Of course, Bob Allen was still the Highway engineer, and Mills, Holcomb, Loforth, and Berning were still the assistants, with Mills the chief assistant, Holcomb the assistant in charge of the planning, Loforth in charge of construction, and Berning in charge of the field work. Frank Bergen came in at that time, I believe, replacing Berning on the field engineer's job. Berning, I said, was in charge of field work. He was, prior to his appointment as assistant state Highway engineer. The assistantship had to do more with personnel in the field than it did with the actual field functions. And "Kink" Melarky, as we called him, C. V. Melarky, was made office engineer, and a man by the name of Art Revert was made an assistant in charge of equipment. The equipment headquarters, of course, was in Reno. Then in the five divisions, there was J. M. Murphy, head of Division One. He replaced Dutch Berning.

I think Dutch Berning was district engineer just prior to that time, after he had come out as field engineer. And J. L. Hancock was still district engineer of Division Two in Reno; and Frank Depp in Elko, Division Three. C. E. Wood replaced C. C. Boyer as division engineer at Ely. The reason for this replacement was not understood by many of us at the time, but we presumed it had something to do with politics, which, no doubt, it did. And J. D. Meacham was made a division engineer at Tonopah, Division Five. Division Six was not yet thought of in those days. Later on, of course, another division was established, and the headquarters was Winnemucca, and Divisions One and Three were more or less split up to produce this extra division.

The laboratory put in some new equipment during this time. One instrument was called the Wagner turbidimeter. The word turbid has something to do with the test. The purpose of this instrument was to measure more accurately than we had been able to do heretofore the fineness of grind of Portland cement. In other words, the degree of turbidity in a mixture of the cement in a fluid at certain time intervals would give, in a sense, the fineness of grind. The finer the cement clinker is ground, of course, the longer the very fine particles stay in suspension, and the turbidity lasts a longer time. So it is possible to get a fineness of grind by this method, and it was much faster than the old handshaking through a very fine sieve.

Another instrument we purchased was called a Los Angeles abrasion machine. That was for testing the abrasive characteristics and resistance to abrasion of aggregates, and it replaced an older type of machine. This machine, I believe, was developed by the engineering department in Los Angeles. That is how it got its name.

Better temperature controls were placed in our moist closets in the new lab; however, it was not possible at that time to control the room temperature in our concrete lab as accurately as was required by the United States Bureau of Standards. Nevertheless, we got by the best we could with the best kind of controls we could put in under the circumstances.

At this time, emphasis was placed on field tests to control the degree of compaction. The amount of moisture a certain soil contains at the time it's compacted makes a great difference in the degree of compaction. We purchased several compaction tubes. The compaction tests, originally developed by the builders of dams, were called the Procter tests. The instruments [for compaction testing] were first used by the state of California, I believe, and others, but they actually did not represent the kind of compaction obtained in the soils and aggregates on highways. Therefore, the California Highway Department developed a little different instrument. It was a long tube, and compactive effort was greater because the compacting plunger had more weight. We installed quite a few of those instruments. We thoroughly tried them out in our laboratory, and when we were satisfied with the results, they were taken out into the field with instruction to the field crews. Sometimes the crews were brought into the laboratory and instructed in the laboratory, and then were sent out on their own on each particular job.

This was a very important thing, we found, to compact the grade as it was being built, rather than letting it settle for a year or two before the pavement was put on, like they had done in earlier days. By getting the right amount of water in there and compacting it with that optimum amount of water, it would usually hold. Some mistakes were made, which were later corrected. For

example, the transition section between the cut and fill was often neglected, to some extent. In other words, if the transition section, as you come out of the cut and go on to the fill area, actually, the soil, as the cut became shallower and shallower, did not get compacted by construction equipment. We neglected making those tests in the early days of this compaction deal. However, later on, we would scarify that transition section and then recompact with the proper amount of moisture that soil in the cut portion itself. In other words, we did not confine the compaction to just the fill materials, but we also made it a point to compact in the transition sections of cuts, and sometimes in other areas in the cuts where certain soil conditions made it necessary.

At this time we began to experiment in the laboratory with different kinds of materials to stabilize base. It is not always possible to find ideally graded aggregates or aggregates with optimum load-bearing qualities. We have to use what is there, and if it doesn't have the proper qualities, something must be added to it to improve it. Several of these experiments were done, both with asphalts and with Portland cement concrete, and these projects were carried out in some cases in connection with the Bureau of Public Roads studies and with the American Bitumus Company and with the Portland Cement Association, as well as some of the oil companies. I mention the word American Bitumus. That is a term applied to the company, a subsidiary of the Standard Oil, which made emulsified asphalt. In other words, two substances which are not miscible can be made miscible, oil and water, for example, by putting in an emulsifying agent. In other words, it was possible to ship asphalt in the mixture of water by placing an emulsifying agent which was stable enough to keep the asphalt from separating out until

the material was applied to the roads. And the American Bitumus Company more or less pioneered this, although other companies did the same thing. This emulsified asphalt could be used cold. It did not have to be heated up like the regular refined asphalt, nor like the regular road oils. All of the road oils had to be warmed up to some extent, and the asphalt, of course, had to be warmed up quite a lot before it could be used in mixing with aggregate—not so with emulsion.

I don't recall any astounding results we obtained from these experiments, but we did learn a lot of things. In this particular biennium, I'll mention the tests by groups, as I have done before. We tested the following numbers of samples: metallic materials—1,370; soils—1,765; surfacing, base, and fill materials—1,093; concrete materials—3,071, about eighty percent of those being concrete cylinders which were brought in to cure and test to get an idea of the strength of the concrete being poured in the field. And bituminous materials, including road oils, asphalts and emulsions—1,308. Chemical analyses, that is, samples which were subjected to chemical analysis—204; and miscellaneous tests—423; the grand total being 9,235, which is a lesser figure than totals shown for other years. But reason for this is that we did not include any of the field tests, which were becoming too numerous to include in our own laboratory report. As time went on, the field testing was left up to the construction department. But that was not done until a regular construction department, composed not only of the resident engineers and the construction engineer, but a number of assistants and testing assistants, was organized [in] the late fifties.

In this era, it was about the beginning of roadside improvement. Our Nevada

engineers were not too much in favor of roadside improvement, the idea being that we were short of money, we were a federal land state, we should use all of the money we could possibly get in order to prove the roads, dustproof them, and get them in better shape for the traveling public, and to heck with beautification. Of course, the Bureau of Public Roads employees, of which were made up of people from all parts of the country, had different views on this. The eastern states, or the other states, in high rainfall belts, of course, could do quite a lot to improve the looks of the highways by planting, and so forth. We were more or less obliged to do something, regardless of the fact that in most places in Nevada, it would be necessary to water any plant growth. Actually, about eightyfive percent of the total precipitation in most places in the state falls out of the growing season, in the late fall, winter, and early spring months, and very little natural rainfall occurs during the growing season. Therefore, we felt it necessary to hold down any planting to the very, very minimum. However, this was begun, and what we did in the beginning, I believe, was to landscape, to some extent, the bridge and overpass newly built at Winnemucca. There were evergreen plantings, and I believe we used the common Hall's honeysuckle for erosion control on the banks. But watering was required, and it was available at that particular location.

Another feature of roadside improvement which was looked into was attention to obliterating old landscape scars. The earlier construction had left borrow pits and even gravel pits, rather close to the highway without obliterating some of the worst scars. Some attention was given to this.

Another item was the construction of rest areas and turnouts, a very necessary thing in this state in particular, where there

were miles and miles and miles of lonesome roads, which could contribute to car wrecks because drivers would often go to sleep. So it was necessary, we thought, to construct rest areas and turnouts, and this was begun.

A few ground covers were used where water was available, but not much of this was done. I do recall that at the intersection of the Charleston Road and the main highway north of Las Vegas, J. N. Murphy transplanted a considerable amount of native materials, cactus and allied plants.

It was necessary at this time, before the World's Fair—at least, it was thought necessary—to enlarge these parking areas and rest areas because we expected much more travel than would ordinarily occur. This, I believe it was 1939 when there were World Fairs in both New York and San Francisco.

Some plantings were made in towns. I recall that we were thinking about doing something on King Street. I seemed to get my finger in the pie because I had grown quite a few things around Carson City and seemed to have some kind of reputation about that. Although testing was my main job, I usually was roped in on these landscape jobs in one way or another. It was decided we would plant a hundred or more *Crataegus*, that is, hawthorn trees, the flowering hawthorn, called Paul's Scarlet, along King Street. A young man by the name of Ben Cardinal, who was employed at least temporarily by the Highway Department, was put in charge of this work under the general supervision of the department (I took a part in that, of course). I've forgotten the exact year they were planted, but we did plant a number of hawthorns along King Street, and the extra ones were placed along U.S. 50, where the old Highway garage was placed. When the new Highway building was placed, many years later, of course, the old garage was torn down and the trees were

partly destroyed, some were moved, but none very successfully. The King Street planting had done quite well, although I believe the very first year, we had to replace eleven trees, and each year after that, for several years, there were always a few to replace. But we had not had much knowledge about what is called the "fire blight." The fire blight seemed to get into some of these trees, and when it does, there's not much can be done about it. There's another little pest—I've forgotten the name of it, but it looks something like a slippery clove, brown in color, which has the habit of destroying the foliage. That, however, can be easily taken care of with a spray. But these two things caused us considerable trouble with the hawthorn trees. Nevertheless, they did mature quite well and usually, in the month of May, they make a nice sight on Carson Street. Many years later, it was decided to place a planting of these trees on U.S. 395 north of Carson. Those young trees are apparently faring about the same manner as our planting on King Street.

Trying to remember the time of events, having never made any attempt to keep a diary, gets me into difficulties. I do recall, in the period sometime between 1937 and 1940, the Western Association of State Highway Officials had a meeting in Reno. I had a part in that meeting, but my assignment was of such a nature that I had very little time to attend the actual meetings. I was assigned, with the help of Mrs. Little, to take care of all the flowers and favors which were usually doled out at that time, and that kept me busy on that job.

Some other things have happened to me, which I will not try to dwell on at length. But during this period, somewhere between 1935 and 1938, I was called to federal jury duty. And the reason I think it's well to mention it [is] because I became acquainted with Carville, who was later governor of the state of Nevada.

At that time, he was the district attorney, and his assistant was Tommy Craven. When you get on a trial jury in a federal court, it does not necessarily mean you're going to be on one jury. There's a period of time (at that time, I believe it was either 90 days or 180 days) in which you are subject to call, and chances are you'll be on many juries, rather than on a single one. I mention this because it is more or less part of the history of the country. In those days, it was against the law to sell whiskey to Indians. I don't know that it was against the law for the Indian to drink it. But I recall so many of those federal cases were whiskey-to-Indian cases; some of them were quite humorous. And when Tom Craven was before the judge, he usually looked for something to say which would get a laugh. Well, I recall, in most cases, these whiskey-to-Indian [transactions] occurred in Reno, around the Truckee River. The Indian witnesses were usually willing to say everything, yet they were a bit reluctant when they had to use words which they didn't like. Nevertheless, Tommy kept working on them, asking them exactly where these things occurred. In practically every case, they happened near an area called the "cribs," which was near the Truckee River. Of course, usually, that brought out a laugh, and the judge would have to bring down his gavel—bring court to order.

Some of the cases were really difficult. A jury trial is a fine thing, but what is a jury of laymen going to do when a set of professional witnesses for a defense says one thing, and a set of witnesses of the seine profession for the prosecution says another? It is difficult for the jury to judge which set is to be given the more credit. This was one case where we had a war risk insurance case up. I believe this was called the Peter Manke case. This man had gone into the service, and his statement was—or, that is, the statement of the attorney [was that] he had

contracted encephalitis lethargica while in the service, and that had affected his health to the point where he had a difficult time walking. And we in the jury took particular note of him. When he first came to the witness stand, he fell down in front of the jurors—a fairly good actor, but some of us had a little question as to the authenticity of that tumble. He did have quite a limp. Some of us remembered that. While there's no association of the jurors and the witnesses or anyone connected with the case, when you are let out at noontime, or recess, there's nothing to prevent close observation. There were two or three of us (I believe Ed Norton was one, and there was one or two others) that kept our eye on Peter Manke. As he went down the street, his limp was quite evident, but we noticed after we got down out of sight of most of the court down, say, a couple of blocks, he began to walk in a fairly normal manner. After this rather tedious court case was coming to a close, and the jury had the case, I think we paid very little attention to the expert witnesses because their statements were so conflicting, we did not know which set of doctors to believe. But our own observations told us a lot more, we thought, although it did not occur [laughing] inside the court. Mr. Manke, as far as we were concerned, was not entitled to compensation. However, I heard that later on, in another case brought up in another federal court, he did win out. Apparently, those jurors were not as observant as were we [laughing].

I mention the federal jury business because Carville, who handled lots of cases, of course, later became governor of Nevada and chairman of the state Highway board. I would like to say something else about some of these witnesses. They were professional witnesses, especially in these whiskey-to-Indian cases, and usually they were plants of other Indians. And we had the same people up

many times as witnesses for the government against some bootlegger or some purveyor of spirits to Indians.

Another area which came under the federal court jurisdiction was the transportation of prostitutes across state lines. We ran into several of those cases, and I don't recall too much about them. Some of them were rather interesting, and Tommy Craven managed to get laughs out of the assembled audience, much to the concern of the judge in these cases. However, I don't recall that in any case, the jury, decided for the government. The evidence in most cases was against the government—that is, the best evidence.

One criticism I would have in serving as a juror was the long, long time taken sometimes in selecting the jurors. Sometimes it took as long as two or three days to select a jury upon which both attorneys, both sides, would okay.

THE WAR AND POST WAR DEVELOPMENT

THE THIRTEENTH BIENNIUM

Just before World War II, there was considerable activity. The thirteenth biennial report, covering the period from July, 1940 to June thirtieth of 1942, of course, covers what little time there was before, and some of the time after Pearl Harbor; and many things were influenced by World War II, which made a big difference in highway construction, maintenance, and highway activities in general. The board of directors were still the same as before—that is, Carville, Mashburn, and Schmidt, and the Highway engineer, of course, was Bob Allen, with Mills, Holcomb, Loforth, and Berning acting as assistants. Melarky was still in as office engineer, and all the other engineers remained the same as head of departments, except that I believe Paul Rawls was made location engineer. And C. E. Wood was made maintenance engineer; I don't recall the circumstances. And Art Revert was the equipment superintendent. I believe he was equipment superintendent also during the previous biennium. The five divisions

were the same except that A. G. Kinne was placed in Division Four, and he replaced C. E. Wood. Murphy, Hancock, Depp, and Meacham occupied the same stations they had previously, and C. C. Boyer was still described as a division engineer at large. As I recall, he had an office in Carson City, and I don't particularly recall just what his duties were as a division engineer, but I think he acted in a consulting capacity.

Several things happened during this biennium. The 1941 legislature (of course, early 1941) passed the Driver's License Division Act, and at that time they made the state Highway engineer the administrator. Of course, this was changed later. That, of course, added one other duty to the state Highway engineer. The war effort, after Pearl Harbor, added to duties of various members of the staff, and perhaps subtracted duties from others. I recall my own experiences during that time. Right after Pearl Harbor, there was some thought that the Japanese might land on the Pacific Coast, in which case Californians would be moving *en masse* to

the east. Therefore, the Highway Department was designated to make studies of the western part of Nevada to see just what facilities we would have to accommodate a flood of people. I recall that Stan Sundeen and I were assigned a section from about the Walker River area, below Bridgeport northerly, to Yerington and Minden, to about Carson City. Ottini and some of the others (I've forgotten who) were assigned those up in the northern part of western Nevada, and these early things we were to observe: first, the condition of the highways and byways (many of them in these out-of-the-way places were no more than pretty good trails); to observe the conditions of the bridges (could they support heavy loads, or would they have to be repaired?); places to obtain drinking water; places to obtain food; places to obtain housing for people. Well, as you might surmise, the area [to] which Stan Sundeen and I were assigned did not have much of any of these [laughing] areas suitable to take care of a population. I think Nevada would've been lucky in that particular area to handle two or three hundred people. Supplies were not available, housing was not available; we just could not do it. Fortunately, the Japanese didn't come this way.

Another job that I found myself into was to accompany Bill Holcomb, who was the planning engineer, investigating possible sites for emergency landing fields for airplanes. We covered the western and part of the northern section of the state of Nevada quite thoroughly. Of course, the things to look for there [were] long, fairly level strips which were not interfered with by highways or by trees or by natural objects, such as rock piles or meadows or wet places or streams. We found several areas which might have been suitable. One, of course, was the present site of Silver Springs, and a landing strip was established at that point.

We had several others in mind, but none of them were used. There were possibilities of using a place between Yerington and a part of Smith Valley. Then, of course, there were others in different parts of the state. Actually, there were only very few emergency landing strips constructed. There was one at Delamar Flats over in the eastern part of the state, and I believe there were some others in the northern part of the state. Fortunately, it was not necessary to have these emergency landing fields because the population did not have to be [laughing] moved.

However, about that time, the Fallon Naval Air Station was about to be constructed. I don't think they had started yet, but a little later on, the Navy did build [in] that area. And we did a considerable amount of testing, on concrete, especially, and some testing relating to the gravels they used and to the subgrade.

About 1942, there was construction in the southern part of the state, and the government decided to build an airport out of Tonopah. At that time, I was loaned by the state to the government to take charge of the inspection on this particular project. It was rather an oddball sort of a title. I can't remember that title. It had something to do with superintendent....inspector. It had quite a few large names. I don't remember them. Anyway, I was assigned to that job, and stayed in Tonopah for a period of several weeks. And Isbell Construction had the contract to lay the first landing strips. I watched that process, and, of course, made my daily reports until such time as someone could be obtained to take my place. I then returned to Carson City on my regular job. In the meantime, I turned over my paychecks—I simply signed them and turned them over to the state and received my salary directly from the state. In that way, I would not lose any time which might affect my future retirement.

Emphasis was placed on the training of field personnel, particularly to do inspection and testing in the 1941-42 period. It was necessary to do certain tests. For many years, of course, we had done sieve analyses on the gravels to check their gradation, and the field men were now required to learn to run the Atterberg limit test (that is, the liquid limit and plasticity index) and had to be outfitted with equipment to do it and trained to use it. And they would also have to do, in the field on each job, the compaction tests to determine the proper amount of moisture to add to a particular soil in order to get the maximum compaction. And methods were devised to determine the actual amount of compaction by excavating holes in the finished subgrade, and weighing the material that came out, getting the moisture content, and from that, computing the compaction. Now, there's some indirect ways to do that which were invented later, such as use of what is called a "sand cone," and eventually, of course, there were other even more modern ways which I will describe to some extent later.

But men had to be trained to do these things, and it was sometimes difficult because the tests were tedious, and not every man was amenable to that kind of a tedious situation. However, we did succeed in training the men fairly well, but it was a problem to keep in contact with so many men. Mr. Morrison did about the best he could do with it, but he also liked to check on the asphalt construction and did not like to spend so much time with these men. Eventually, a change was made in personnel so that this testing category could be placed in under the construction department, with well-trained men to supervise. The regular laboratory employees were doing it at this time, and it took a great deal of our time to get results. Nevertheless, we did begin to get results.

Now the testing categories in the central laboratory during this biennium were about the same as those of the previous year, except that the volume of the chemical and physical tests of soils was greater than it had ever been. The other items were about the same. I shall not repeat those here, but leave it at that statement, that the volume of work in the central laboratory was about the same.

Some new equipment was added, principally a Hveem stabilometer. Francis Hveem was, by this time, I believe, assistant testing engineer, the chief assistant in the state of California. Later, he became the head testing engineer for the state of California. Francis Hveem was not a college man. His education consisted of a high school education and on-the-job education, but he was an inventor. And he was a very, very brilliant fellow. He invented a number of machines, and testing machines in particular, during his stay in the California Division of Highways, and he was known all over the world for his work in this respect. This Hveem stabilometer is an instrument used in evaluating the stability of an asphalt mix under the highest temperature to which it would be subjected in nature, for example, perhaps a hundred and twenty degrees, of something like that, in sunny areas. It was an important piece of work because many mistakes had been made before such knowledge was available, mistakes all over the country in that respect. This machine had some peculiarities about it, which took quite a lot of work to understand. But some other things which went along with the machine were purchased later, such as a compacting device called a kneading compactor, which presumably compacted the material in the test mold to the same degree of compaction as would be obtained under field compacting conditions. This equipment, also, was invented by Francis Hveem. This, we

thought, would be a valuable instrument for us, and we began making extensive use of it during this biennium.

Field laboratories had to be equipped to provide the kind of testing that was needed under these new ideas. The Bureau of Public Roads had developed a gasoline-operated, sieve-shaking device. We borrowed their idea and had our shop make up a number of those, which were supplied to the various field test shacks. Of course, the test shacks were all provided with the necessary drying equipment, sampling equipment, and compaction test equipment in addition to these other items heretofore mentioned.

During this period, outside agencies made extensive use of the Highway Department laboratory because there were really no commercial laboratories in the state (locally), at that time. Among these agencies, of course, were the Naval Ammunition Depot at Hawthorne, and the U.S. Army Engineers in several of their local nearby endeavors, and the Civil Aeronautics Authority, and to some extent, the Forest Service.

In this biennium, also, roadside improvement continued. Shade trees were planted along U.S. 40 above Lovelock. These were all of the Chinese or Siberian elm variety, and there were more of this same variety planted along U.S. 50 west of Fallon. At the same time, the state developed a rest area and recreation area for the traveling public, as well as for local residents, at Verdi. This was named the Crystal Peak Park. However, this roadside improvement work was pretty much discontinued during the war.

THE FOURTEENTH BIENNIUM

I think I shall give the lab roster at the start of World War II. At that time, there were twenty-four of us working in the

materials section. I'll name these of f. There was Jim Archer, John Curtis, Fred Davis, Bob Ducker, Fred Forbusch, Frank Garaventa, James Goldsworthy, Robert Golightly, Carl Gottschalk, George Hardman, Jr., Perry Krebs, L. W. Little, R. C. McLain, Louis McMurdo, Clarence Meginness, Edward Maher, Frank Morrison, Gray Mashburn, Jr., Gene Robens, W. D. Robohm, Mary Rochon, M. C. Ruedy, James Sullivan, and P. L. Woodgate. Among these, a number went into the service, some right away, some a little later. Among those in the service were the following: Bob Golightly, George Hardman, Jr., Ed Maher, Gray Mashburn, Jr., Gene Robens, Melvin Ruedy, and James Sullivan. George Hardman was lost in the Pacific. He was a Naval airman, and he was lost in the Pacific. I do not know the details. Gray Mashburn, Jr. had an accident at the London training field. He crashed and was killed. His body was interred in the Reno cemetery. Sullivan, Ruedy, and Robens, also Golightly, went into the Army. Gene Robens advanced very rapidly, as I stated when I was describing the state detachment of the National Guard. Ruedy served in the Pacific area, Sullivan went to Europe; I don't remember at the moment where Bob Golightly did go. Ed Maher was with the Marines, I believe, and he was in some of the fierce battles in the Pacific. He advanced quite rapidly, also. These boys, except Hardman and Mashburn, returned after the war, and all came back to the lab, I believe except Sullivan, who took care of his grandfather's cigar store for a while, and then eventually came back to the laboratory.

I think I shall mention also the names of some of the total of 123 Highway Department employees in the service in World War II. I'll mention the names of department heads or assistant heads. There was Stanley Sundeen, the office engineer; Frank Lyman, who was

the chief draftsman at the time he went into the service (Frank stayed into the service because he was also in the National Guard in an officer's position); M. E. Norton, who was assistant chief accountant (he was also in the National Guard as an officer, and stayed in the service, and retired from the service instead of coming back to the Highway Department). There was Orvis Riel, who was chief of the planning division; Jack Cooney, the chief architect; Cy Myles, who, at the present time, is the location engineer for the Highway Department; and Owen Joseph, a former resident engineer, now division engineer at Elko; John Flournoy, who had worked in the laboratory, but at the start of the war, I believe he'd been transferred to Bill Holcomb's department, in the planning section. At the present time, John Flournoy is acting right-of-way engineer. Denton Hayes, who is one of the assistant state Highway engineers at the present time; Melvin Fodrin, who's chief of the secondary road design section at the present time; [Albert G.] Al Kinne, now deceased, who was one of the division engineers during his stay with the Highway Department, and for a longer time, was the chief of design, I believe he had the title as an assistant state Highway engineer in charge of design. And John Bawden, the present state Highway engineer; and Ralph Ottini, who is assistant Highway engineer at present. Both Bawden and Ottini were with the Navy. Dale Rose was a retired division engineer at Elko; and R. E. Eldridge, who was the past assistant state Highway engineer; and Jerry Wolverton, who was a construction engineer for a while, now deceased; and Bill Nagel, who, at the present time, is chief designer.

The entire list of these Highway employees who were in the service can be obtained from the biennial reports. I believe the report for the biennium 1942-1944 will show these names.

In the biennium of 1942-1944, which was the fourteenth, the directors were Governor Carville; Alan Bible, attorney general; and Henry C. Schmidt, state controller. Highway engineer, again, was R. A. Allen. H. D. Mills was the principal assistant Highway engineer. W. T. Holcomb was assistant in charge of planning, a division which was fairly new; and Art Loforth, who was made an assistant Highway [engineer] in charge of construction; and A. Berning, Jr. (we called him "Dutch"), assistant Highway engineer in charge of personnel. In those days, however, the personnel department and the construction department was not [as] fully organized as they were in later years. The planning department was very fully organized, and was doing a fine piece of work from its very outset. The construction department was enlarged in later years, especially when it was time to work on the Interstate system. The other department heads were pretty much the same as in the 1940-42 biennium, except that Matt Walsh replaced Art Revert as assistant engineer in charge of the equipment. And W. R. Perry came up from resident engineer and replaced Al Kinne as division engineer, Division Four at Ely. Kinne had gone to the service. And Raby J. Newton, who had been an assemblyman from Clark County and chairman of the Ways and Means Committee, was appointed as assistant in charge of the driver's license division. C. C. Boyer remained as a division engineer, apparently at large, or without a particular portfolio. But he did [have] certain very important assignments, nevertheless.

New construction during this biennium was severely curtailed. As a matter of fact, there were only two contracts let on U.S. 40; one was a bridge, and the other, a section of roadway, and both of these came at the request of the War Department. Roads had to be kept

in repair in case rapid transit were necessary, and as a matter of fact, highway transit was almost as important in getting supplies across country as railroad traffic. Another job was the construction of a bridge on Route 12 at Logandale. The purpose of this was to get milk from the Muddy River Valley to the military people in the Las Vegas area.

In comparing construction mileage, we might show, as is stated in the biennial report, that only forty miles were constructed in 1942-44. This is compared against the 1940-42 biennium of 283 miles. However, there were other construction projects taken over by the state Highway Department. It was necessary to construct a number of flight strips. Several of those were scattered out throughout the state. There were four, in particular, which were built right away: the one at Elko in Elko County; another in Lincoln County, down near the Delamar Flats; and one in Lyon County, which was over what is now called Silver Springs; and another in Lander County, near Austin. Other airfields, of course, were constructed on a larger scale, such as the one at Tonopah and Las Vegas, but they were not constructed by the state Highway Department. However, I think I stated before, I did assist as an employee, loaned to the government for a short time, for the beginning of construction at the Tonopah airport. Actually, the Highway Department, though, had no direct concern in these matters. These four fields mentioned were principally emergency landing fields. Frank Morrison, the chief testing engineer, had quite a lot to do with the construction of these airports. He enjoyed the field work, especially where asphaltic construction was concerned, and was pretty much placed in charge of the inspection and overseeing of these areas when they were built.

I recall some pictures that someone had taken (perhaps it was Frank Morrison) out in

the Delamar Flats. That particular airport was constructed in midwinter, and it showed the asphalt plant (we usually called the hot plant) with long icicles hanging from it. Ordinarily, asphaltic construction is limited to warm weather, but these were days of emergency, and all kinds of things were done out of the ordinary. As a matter of fact, other things were done, regardless of climatic [laughing] conditions, which were very much out of the ordinary.

The testing activities during the fourteenth biennium, as I've stated before, were greatly reduced, as were all activities in the Highway Department, except maintenance. Going back again to the Highway Department, in general, before discussing laboratory matters, I believe there was about as much work done on maintenance of the roads during the wartime, perhaps even more, than there had been done in peacetime. Practically all the roads were kept in constant repair because of emergency traffic.

While very little construction was possible due to wartime restrictions, arrangements were made, at both state and AASHO levels ([when] I use the AASHO [I'm] using the initials A-A-S-H-O, which stand for the American Association of State Highway Officials). At both those levels, arrangements were made to plan construction for postwar years, construction which would extend and improve the highway systems in use, and eventually lead to what are now known as the freeways, or Interstate systems, across the country.

Now, in turning again to the laboratory, although the work was greatly curtailed, we did have quite a considerable amount of testing. The volume, however, of the samples was quite small in comparison to those of former years. For example, during this biennium, only 5,326 samples of various

kinds were tested, as compared to 9,282 in the biennium 1940-1942. Work was principally on samples of materials used in maintenance and on aggregates and soils resulting from material surveys made on future projects. We knew that certain roads, when the time came to do it, [and] when the money was available, would have to be reconstructed, but we could do something in advance. Knowing for sure where the lines might go, we did make soil surveys, and also, material surveys—that is, materials to determine locations of suitable aggregate deposits for making concrete aggregates and aggregates for base and surface and borrow, and the like. Many projects, however, were going on outside of the state Highway departments, which required testing, and there were no commercial laboratories in the state at that time capable of handling those tests. Therefore, the Highway Department laboratory performed many tests, especially for the following construction projects: the Naval Auxiliary Air Station at Fallon; and the Sierra Ordnance at Herlong, California; the Cochise airport, Cochise, Arizona; and airports at Lovelock, Winnemucca, Austin, Minden, and so forth. Nominal charges were made to outside agencies for the testing on most of these projects. Of course, there was very little equipment added in the fourteenth biennium—that is, laboratory equipment. However, there was one large electric oven purchased, which was used to assist with the so-called bottleneck, which had developed in drying the aggregate samples which were subjected to the sodium sulfate soundness test. And the summary of tests for this biennium showed quite heavy in asphalt samples, mainly because quite a little asphalt had to be used in maintenance and repair. It also was rather heavy in concrete cylinders, which originated from the several U.S. government construction projects named above. Airport

runways, principally, were made of asphalt, but the landing strips, where the heavy planes landed, usually had to be made from concrete. And, of course, there was foundations for buildings and appurtenances.

THE FIFTEENTH BIENNIUM

In turning to the next biennial report, Number Fifteen, July 1, 1944 to June 30, 1946, one recommendation was noted, which was a real important one to all of us employees. A strong recommendation was made at that time (and I think there had been recommendations made prior to that, and many later on) that a system be set up for retirement for all state employees.

Now, turning to the directors and the officials in the Highway Department during this biennium, Governor Carville resigned in July of 1945 to become United States Senator. And his place was taken, of course, by Vail Pittman, who was lieutenant governor, and, of course, acting governor. This part of the biennium was under supervision of a new board, which, then, of course, was composed of Pittman, Bible, and Henry Schmidt. Bob Allen was still Highway engineer, and Mills, chief assistant. And, Holcomb, Loforth, and Berning remained in the same positions as assistants. However, Art Loforth had a severe heart attack, and he tried his best to get along with that heart condition, but he passed away in January of 1946.

There's a humorous incident I can always remember, and I'm sure quite a few other Highway employees remember about Art Loforth. As I recall, Art may have been a bachelor, but eventually, he did get married, and his wife was quite a proficient person in watching over Art. Once in a while, he'd like a little snifter, even after he had his heart attack. I recall we were at a meeting. I guess

it was a WSHO meeting (that is, a meeting of the Western State Highway Officials) in Reno, and Art was just a little bit under the influence— not much, but a little bit, and he made his remark to his fellow compatriots around there—if his wife comes, he says, “Well, if she comes up, I’ll blow my breath in the tiger’s face!” Pretty soon, Mrs. Loforth came in, picked up Art. He went out like a lamb, her leading him out [laughing]. What I’ve just stated is no discredit to Art Loforth. He was a very proficient engineer, a brilliant man.

In proceeding with the changes in officials during this biennium, Dan Indermuhl came in with an appointment as assistant engineer in charge of traffic and signs. And Bob Guinn, Robert F. Guinn of Reno, was made manager of the planning survey. The division engineers were the same as were listed in the previous biennial report, Number Fourteen.

It was during this biennium, that Congress passed a bill which was an enabling act in reality, which, you might say, gave birth to the idea, long in the minds of many highway engineers, as to future construction. This might be called the bill which made possible the Interstate Highway System and also made possible extension of federal highway aid, financial aid I’m talking about, into urban areas. And it also authorized aid in the construction to what were first called farm-to-market roads, or, in Nevada, we might have called them mineto-market roads sometimes. In general, they ended up as so-called secondary roads. The meat of the bill had been worked up and strenuously promoted over the years by the American Association of State Highway Officials, and although strongly opposed by the populated eastern states, it did pass into law. Thus, there was afforded positive assurance that federal monies would be available for greatly

expanded highway construction in all the states.

The western states, however, the so-called public lands states, and especially with Nevada, with approximately eightyseven percent public lands, would then be enabled to keep apace, pretty much, with other states in the several roadway categories. The federal money thus apportioned, according to the ratio of federal lands to state and private lands, would make this possible.

In turning to the section in which, of course, I was most interested, the laboratory section, the testing and research functions, I’m going to list the names of the people who were with us at that time. There were fourteen full-time people and two part-time, as against twenty-four full-time people in the list I read, which applied to the time of Pearl Harbor. The laboratory employees at the end of this biennium were the following (I’ll read the names first of the steady employees): Glyn S. Chapman, Johnny Curtis, Fred Davis, Frank Garaventa, Jim [G.] Goldsworthy, Carl Gottschalk, L. W. Little, J. H. Morgan, F. H. Morrison, Norman Noteware, John [J.] Quinlan, W. D. Robohm, and P. L. Woodgate, and Dale F. Borden. Quintero Gilbert and Charles [J.] Fenner were on temporary employment, part-time employment.

The materials and testing and research division functioned in this biennium in a manner about the same as that of the wartime biennium immediately preceding, that is, the fourteenth. Thus, the total samples tested in 1944-46 amounted to a low figure of 5,196, compared to a similar low figure of 5,326 tested in the 1942-44 period. Again, the highway maintenance and the U.S. government construction and other outside construction contributed more than state Highway construction did to the volume of samples. As a matter of fact, state Highway

construction during this biennium was practically nil. Considerable time was thus available to the laboratory personnel to make special studies and perform research.

One investigation had to do with Portland cement concrete structures, which, in certain areas, showed evidence of incipient deterioration. Maybe like an old schoolteacher, I should explain that word *incipient*. It means, "the beginning of one of the first stages of." The study pointed to use, possibly, of some special types of Portland cement, with the additional requirement of an air-entraining agent. Now, when we mention an air-entraining agent, I must say that it was quite by accident that the purpose of an air-entraining agent was discovered. What the air-entraining agents appear to do in many cases is to keep the concrete surface smooth for a very long time without the large cracks and hair cracks appearing, and give a better finished surface. The air is entrained in a very minute, extremely minute, in fact, microscopic bubbles, you might say, throughout the mass.

How this was discovered is rather interesting. I don't know that I have all the facts correct. I believe someone in the eastern section of the country—perhaps it was in Illinois, a new employee was hired in the cement plant, and he thought those rolls, which break down the rocks and grind the lime and siliceous rocks with powder, should be lubricated. So he found some tallow, and he pasted tallow on the rolls. No one knew what was happening at the particular time, but later on it was discovered that where this same cement, with the same aggregates, were used on a job adjacent to a similar job placed at an earlier date, where that had occurred, there was a marked difference in the behavior. The earlier concrete construction showed very many flaws, cracks, and failures, where this

new concrete construction, using identical cements and aggregates and water, with slump and other tests practically identical (strength tests about the same)—this particular section held up beautifully for many years. A thorough investigation finally ran down the solution to the problem. This man had placed tallow on the rolls, and the tallow had acted as an air-entraining agent.

So, what resulted? They then began to test different kinds of agents such as the waste sulfate liquor from paper mills, and other things, as an air-entraining agent, and purposely put it into the concrete at the time the concrete was being poured. Of course, it was not made into the cement. Later on, however, they did make air-entrained cement, but it was found necessary to control the air within certain limits, for example, within, say, about two percent to, say, four or five percent. But too much air-entraining agent, the concrete would show defects, and too little, of course, wouldn't be quite right. So it was found much better to add an air-entraining agent to the raw mixture, as the water and cement and aggregates were mixed, than to make an air-entraining cement. Better control on the air was obtained in this manner, in the future, that is, I'm talking about, not at this particular time, when everybody was studying this. However, we did make a considerable amount of study of the air-entraining agents, and after wartime, we did use them. I will explain that at a later date.

Other studies were made in our laboratory on sodium sulfate resistance of Portland cement mortars. Of course, in this Great Basin, between the Wasatch Mountains and the Sierras, the waters, for many, many centuries, never reached the sea, although at one time, there was a way for the water to get out of the basin into the Snake River, but that was in past geologic ages. Thus, the area was

particularly well saturated, in some instances, with various kinds of salts, common salts and chloride, sodium carbonates, bicarbonates, sodium sulfates, very few nitrates. Sometimes these salts were found in combinations. And they had given trouble in highway construction very often. So we had done some studying during this biennium the effects of sodium sulfate in particular.

The bad actors, the three worst bad actors, probably, were sodium carbonate, sodium sulfate, and common salt. The sodium carbonate and sodium sulfate salts are called deliquescent salts because they have a tendency in temperature changes to add or subtract water of crystallization. When fully hydrated, each molecule contains, in addition to the basic elements, like Na_2SO_4 —that is, sodium sulfate and oxygen—in addition to that, it contained ten molecules of water to form the crystals. And when those substances are warmed, they lose part of this, or when they're heated to a great extent, they can be dehydrated almost completely. However, when they do the opposite thing, when they start out with a low water content, and a moisture supply is made available, the salts tend to concentrate in certain areas; they draw more of the salt to them, and at the same time as the crystals grow, the entire mass grows, and what we call "salt boils" are formed. One such of these was what my wife and my sister and I struck in the road in Utah. Sometimes those things come come up overnight. And where it's done on a highway, the maintenance people sometimes do not have time to catch it in order to save someone from damaging their car, or being injured personally. A further discussion of this will be made available at a later date, as there was a meeting in Salt Lake City among highway engineers in which this was one of the principal topics. However, these aggressive salts, in addition to causing trouble

with salt boils, also caused considerable trouble with highway construction materials, such as metals and cements. I don't recall that they affect asphalt products as much as they do metals and mineral cements, like Portland cement.

In this same biennium, we made other studies of certain aggressive solutions upon asphalt asbestos-bonded metal pipe coatings. It had been found that by placing asbestos in the asphalt coating, which was what is called a "blown asphalt," an oxidized asphalt, placing asbestos with the asphalt on metal pipe to coat it gave much better protection from abrasion, and also, from these salts. We did some work on that and confirmed the findings of others. We also continued certain research with respect to the Carson River watersheds. I believe that was done to determine the amount of pollutants in the water, but I never did find out for sure just what the main object of this project was at that time.

Duties of the materials and research department have been explained in earlier reports. I think, at this time, I will restate them as they are shown in the biennial report for 1944-1946. They include [quoting from report]:

....routine investigations of the physical and chemical properties of raw materials and processed products entered into highway construction.

These few words cover a tremendous amount of materials: all the raw materials, such as aggregates, soils, and the like; and the manufactured materials, such as steels, other metals, cements, asphaltic products, and so forth. It includes, also, "special investigations of the service behavior of these same materials," those service behaviors I have just discussed in stating that certain research was done during the biennium on behaviors of certain materials. The duties [also] include

“special investigations of the properties of new materials not yet generally in use.” The AASHO, that is, the American Association of State Highway Officials, all of the testing engineers in that group form a body which might be called a testing senate, or a testing legislature, which develops specifications for materials and for the test methods in testing them. And many of the new products, sometimes, or new operations, are researched by various highway laboratories, and reports made at the general meetings which are held annually in Washington, D. C., and from those meetings, new materials are added in the specifications. And these studies are important. Some states do more work on this than others because they are better financed and better equipped to do it. Nevada, being a small state, did not do too much of this type of work, although we did quite a little bit of investigation on asphalts.

Another duty, of course, and a principal one, of the materials and research section, was the preparation of reports of all investigations, and the writing, of course, and compiling of specifications and instructions, and supervision of field personnel in charge of field tests and inspections. The preparation of test reports, in itself, is quite a task. Also, the testing division is requested upon occasion to prepare papers for delivery at different technical meetings of highway departments and other organizations.

One thing which I have failed to mention heretofore, I believe, was the work of the laboratory, which was an extra job, in connection with the weather records. Very early in the Highway Department's history (I believe this was started perhaps by Billy Holcomb when he was testing engineer), the Highway Department acted as the weather station for Carson City. This was a volunteer job. No one got paid for it. But every day

certain measurements had to be taken. The minimum temperatures were usually taken in the morning, and sometimes the maximum temperatures, late in the afternoon. However, you could take both the maximum and minimum temperature readings at one time, usually done in the morning because the weather bureau thermometers furnished out of the Reno weather bureau were arranged so that the maximum readings were established by a certain set. Once they got there, a little marker showed that figure, so that you could read it, probably the next day, without any difficulty, the same with the minimum temperatures. So each day a record was made of maximum and minimum temperatures. Later on, a rain gauge was obtained, and on days we had rainfall, the rainfall was measured. When it snowed, snow depths were measured on level ground, and the precipitation, or the amount of moisture in the snow, was also determined sometimes, by the rain gauge, by taking the funnel section off and allowing the can to fill with snow. These reports were made out monthly and distributed around the state to interested people, and were also always sent to the weather bureau. However, each day, the weather was obtained by local newspapers and sometimes by Reno papers by phone. This was a service which demanded the attention of someone, and we used to take turns on taking these readings on weekends and holidays.

Frank Morrison was a great hand to make much of the weather conditions. He would describe the cloud formations sometimes, and wind, although we did not attempt to measure wind velocities in the early days. Then in later years, I believe around the 1940s, Frank Morrison would take time to compile an annual weather report. He usually did this in the late fall of the year, when construction was not very heavy, and his services out in

the field were not required. He made very detailed reports, showing the average monthly and average yearly precipitation, high and low temperatures, average temperatures, and any other unusual phenomena which were measured. Among the unusual things we recorded, would be lunar and solar halos, eclipses when they occurred, and flooding—sometimes made mention of forest fires, although they did not always have to do with the weather.

About 1943 or '4, I occasionally wrote articles about the weather for some of the local newspapers. Denver Dickerson published a few of these in those years when he was operating the *Carson Chronicle*, I believe it was called. I believe Wesley Davis, who later operated the *Chronicle*, published a few of these. I did not write very many, but just upon occasion, usually by request.

During this biennium, we were again required to do a considerable amount of testing for outside agencies, such as the Naval Ammunition Depot at Hawthorne; the Naval Auxiliary Air Station, Fallon; the Veterans Hospital in Reno; and the Civil Aeronautics Administration; the U.S. Indian Service; the United States Bureau of Mines; and also, the state orphan's home; the state Bureau of Mines; Verdi Fish Hatchery; the state prison; and for [the] municipalities of Carson City, Reno, Las Vegas, and Pioche; and for the Washoe County Courthouse. We also did special tests from samples submitted by sixteen contractors and several individuals.

During the biennium, there seemed to be a bonanza in making lightweight aggregate bricks and building blocks. Everyone that could build a little plant seemed to be bent on obtaining lightweight materials, and many of these would-be manufacturers would send their lightweight blocks to us for testing. On all of these outside tests, we usually made a

minor charge. No new equipment whatever, except for a few small items, was added during this biennium, principally due to lack of sufficient funds. There was a time, during one of these years (I think it was much earlier, however), and I may have stated this before. But there was a time when money was so scarce that we had to send the single fellows out on jobs part-time. They worked for three weeks and were off for one week. I may have mentioned this before. But that was a case of scarce money.

During this interim, I occupied much of my time on jobs other than strictly laboratory work. At one time, I was handed a little job to do for the city of Elko. The Highway Department was asked to design a city park, using a few trees and a swimming pool, which had already been built, as a basis. This I did. I drew up a park, but I did not ink it. That was left up to the design division. It took me some little time to do this, and while it was not strictly highway work, it was a piece of work which was done, and I happened to be the person they picked to do it.

THE SIXTEENTH AND SEVENTEENTH BIENNIUMS 1946-1950

I might state, at the present time, that our new laboratory, which was ready for use in 1936, did not stay in its original condition for a very long time. The planning division, that had been organized in the department, was crying for space; therefore, planning and traffic had to have more room, so arrangements were made to build a second story on the new laboratory and connect the laboratory building with the Heroes Memorial Building. By so doing, we were not too much inconvenienced in the laboratory except that we lost the storeroom we had originally planned on because a portion of that had to

give way to a passageway from one building to the other. Billy Holcomb and his planning and traffic division was moved into the new building, which was built in just a few short months. I've forgotten the exact date.

I think I shall try to cover, in the next period of time, some of the events that happened during the administration of Bill Holcomb as state Highway engineer. First of all, however, I would like to describe Billy as a man and a character. Billy was a friendly person. He made friends with everyone, and he was well known throughout the state and in other areas where he had traveled. He was a short little guy. He was very fond of sports. He played baseball, and I believe he was, at one time, Nevada state tennis champion in earlier days. I recall at the ball games the remarks from the audience, "Hey, tell that guy down there playin' second base to get up out of that hole!" [He was] a short guy, and he was subject to all kinds of comments in that respect.

Billy had a daughter, whom I never met, by his first marriage. At the time I arrived in Carson City, he was separated from his first wife. Later on he married Genevieve Murray, who had been working in the Highway Department, and he and Gen raised a family of a boy and girl. They went on through the schools here, and I believe the boy eventually finished a law school back East [and] is a lawyer somewhere in the East. The girl, I believe, finished the University of Nevada, and is now married and I believe she's living at Lake Tahoe.

Billy was very active in community affairs. He was a member of the Rotary Club, and he was the second president of the Carson City Rotary Club after its founding. Billy made a good president, and his humor was well appreciated by all. He was active in Rotary for many, many years. Billy was also active in youth affairs in the community, and when time

permitted, took part in many affairs. Billy was, as I say, a good mixer on all occasions, and he was a good engineer. When he was in charge of his particular departments, he carried the job through with dispatch and in good, sound engineering practice. As state Highway engineer, he followed through pretty much the procedures and methods which were handled by his predecessors, which might be described, generally, as a sort of conservative manner, especially with respect to the handling of funds. Nevada, being such a small state populationwise, was always handicapped, in a manner of speaking, in getting sufficient state funds to match the federal funds in highway construction. And therefore, it behooved the state Highway engineer at all times to admonish all his division heads to keep in mind the economics of things, especially in the design work and planning, and testing, and in all other operations which would affect the financial condition.

[Billy] was employed in the Highway Department, I believe, shortly after World War I. And going over the old records, I believe he had as much as forty years or more, perhaps, in service, before he left the department. He left the department, I believe, sometime in the late fifties or early sixties and did private work, and worked for contractors in the Las Vegas area; later [he] took a position in Washoe County. And I believe he had mainly to do with planning, as a planning engineer in the city of Reno. Billy stayed in the harness, so to speak, right up to the time he became very ill. And I've forgotten the exact date he passed away, but I believe it was within the last eighteen months. Perhaps it was in 1969 or 1970. His widow, Gen, then moved to Carson, and is located in an apartment house here.

There is one thing that I always remember about Billy. Billy and Ed Norton and I had

birthdays the ninth, tenth, and eleventh of December, and if we did not celebrate them together, we had always sent congratulatory or comic cards at that time. This last year was the first year that, of course, the three of us were not together, did not have a chance to get together. But it was very nice of Gen Holcomb to send the usual birthday card.

Robert Allen's term as Highway engineer ended early in 1946. There was a change in the board of directors, which, no doubt, had an effect on Allen's employment. The new Highway board was composed of Governor Vail Pittman; Alan Bible, attorney general, was held over; and Jerry Donovan, the new state controller. Billy Holcomb was then appointed Highway engineer, and the other department heads remained pretty much as they were, except for the following replacements: George Egan was given the job of engineer of surveys and design, and J. D. Meacham was advanced from division engineer of Division Five, Tonopah, to chief construction engineer. And C. C. Boyer was made engineer of federal aid roads. Malcolm McEachin was made director of safety, a new office, and J. C. [Matt] Walsh was made assistant administrator of driver's license division. And Frank G. Lyman was made assistant engineer in charge of surveys and design. Kenneth Buck was made director of public relations; Stanley Sundeen was assigned to the job of chief draftsman, and Ralph Ottini was made traffic engineer.

A new policy was invoked at this time, also, with respect to the divisions. Three of the five division engineers were given assistants. Division One, at Las Vegas, was given an assistant, G. B. Brockway, who assisted W. O. Wright, who replaced J. M. Murphy as division engineer there. Then J. L. Hancock, division engineer in Reno, Division Two, was given as his assistant, H. A. Squires, who was advanced from resident engineer. And in

Division Three at Elko, Julian Glock became division engineer, replacing Frank Depp, who passed away, I believe, in 1947. And R. E. Eldridge was made assistant. W. R. Perry was given the division engineer's job at Division Four in Ely, and Denton Hayes was made division engineer of Division Five at Tonopah.

Many of the above appointees were war veterans who had returned. Now, in comparing these officials with the officials of the seventeenth biennium, the board was the same, and the department heads were about the same with some exceptions, of course. Al Kinne, A. G. Kinne, was moved to headquarters as right-of-way engineer. He replaced Dale Pruett, who had passed away about a year and a half before. And the following people were not listed in the seventeenth biennium for various reasons: Frank Lyman, Walsh, Ken Buck, and McEachin. I believe the legislature changed the law so that some of these people were in a different department. And Frank Lyman, as I recall, had gone back into the service because he had been an officer during World War II. The division engineers and assistants for this biennium were the same, except that Division Four at Ely was given an assistant, Paul Robbins, who was advanced from resident engineer.

In the sixteenth biennium, 1946-48, something new was added, and was again continued in the seventeenth biennium. The sixteenth biennium was dedicated to employees of long standing service, and gave the names of those awarded service pins. Now, the fifteenth biennial [report], however, was dedicated, also, to longtime employees, but no individuals were named. In this particular biennium, in the twenty-five years of or more of service, there were fifteen names; in the twenty- to twenty-five-year bracket, there were twenty-three names, including

Frank Morrison, the materials and research engineer. And in the fifteen- to twenty-year bracket, there were forty-two names. These included two out of the materials and testing laboratory, P. L. Woodgate and L. W. Little. I'm not bothering at this time to give the names of everyone. I'm rather, confining it to the laboratory employees, that is, to name the names. Later on, I may mention some of the names who received long time awards other than those people from the laboratory.

Now, turning to the next biennium, the seventeenth, there were four men given awards for thirty or more years of service. And that included August Berning—I said men, I should say employees, and it included Bonnie Reid, W. T. Holcomb, and Ernest Pohl. And in that biennium, there were eighteen people in the twenty-five- to thirty-year bracket, twenty-one people in the twenty- to twenty-five-year bracket (including Frank Morrison and L. W. Little from materials and testing), and there were fifty-three people in the fifteen- to twenty-year bracket (including P. L. Woodgate, of the laboratory).

In the sixteenth biennium, it was recommended that the legislature provide for a new Highway building because of overcrowded conditions, especially in all sections, with the possible exception of the laboratory. And in 1949, the legislature okayed a new Highway building, and presumably, at that time, it was ready to occupy in 1951. The legislature, I believe, earlier, had divorced the driver's license division and the highway patrol from the Highway Department, and placed them under the control of the Public Service Commission. So the heads of those departments no longer appear in the Highway Department officials.

In this period, from 1946 to 1950, there were many, many problems. Probably one of the worst problems was the difficulty

in finding enough qualified personnel to carry out the work. There was a demand for engineering personnel all over the country, and the supply was much less than the demand. And in order to alleviate this situation as much as possible, people who perhaps did not have academic engineering training, but had long years of experience in engineering were advanced to the more difficult jobs. And new recruits were added when and if they could be found. I believe there was some advertising done in the papers in all the states, and a few new recruits were brought in. Also, university graduates were asked to come in, but usually, private industry paid more money than the state could pay, so there was a problem in that respect.

Dutch Berning was given the job of personnel director, and he handled it efficiently, but he really had a problem on his hands because of this lack of qualified personnel. Of course, Dutch's job also had to do with transferring personnel from job to job as they were finished, or as new jobs started, and also, to take care of some ticklish problems which occur once in a while in the personnel field.

Another problem was to try to cope with a tremendous increase in roadway mileage, both to construct and to keep in repair that which is already built. Money was one reason this was held back, but I believe the state managed as best they could, and perhaps very well under the circumstances, to keep up with the road repairs. The war damage was severe, which meant not only repair, but reconstruction of roads already built, in many cases.

Another problem was the increased cost in right-of-way acquisition. It was thought perhaps things would go back to normal after the war was over, but that was not the case. Labor was unavailable, engineers were not

available, costs were going up in all directions. There was an increased cost in construction items, due to rising costs of materials and labor. The contractors' bids were found to be higher than they had been previous to the war.

Then, there was a tremendous increase in traffic, both in volume and in the case of trucking, increased wheel loads, which added problems to highway construction, which eventually were taken care of by ideal, we might say, planning, as near as planning can be ideal. The planning department[s] all over the country, under the federal government and Bureau of Public Roads direction, finally adopted means of estimating future traffic, both as to volume and wheel loads so that the roads could be constructed to last perhaps fifteen or twenty years, by projecting, or extrapolating, traffic growth to the wheel loads, volumes, a certain number of years, say, fifteen years or twenty years in the future. Heretofore, we simply built the roads the best we could with what money we had and hoped they would last, which was not always a good plan, but it was necessary, on account of lack of proper funds.

In discussing the laboratory personnel, actually, there was not much increase during this particular period, although we were busy. I'm going to read the names on the roster at this time. There were seventeen, and alphabetically down the list, there was Lillian Amodei, our clerk typist; Tom Bailey; Mary Cameron, who had been clerk typist, but I believe she was on this list, which was taken in August 1950, just prior to the time that Lillian took over. And I believe that was about the time that Mary Cameron married Edward Marriage, the son of Charles Marriage, the ex-state librarian and man of note. By the way, Ed Marriage later worked in the laboratory as an assistant, and finally became a division engineer, and at the present time, of course,

is construction engineer in the state Highway Department. So much for that. Then there was Fred Davis; Dale F. Borden (Dale was in charge of the material surveys at the time); and Carl Gottschalk, our very fine chemist; and August Juhl, who was an assistant to Dale; and Hal [G.] Kispert, who was in charge of the concrete materials laboratory; and L. W. Little; and J. H. Morgan, who was in the field crew; F. H. Morrison, chief testing engineer; Norman Noteware, who worked as roustabout almost anywhere, but was a qualified chemist, and handled quite a few special problems. There was P. L. Woodgate in the soils laboratory and aggregate laboratory; and Paul Rubin; and R. D. Smyth, a temporary employee; and E. G. Scoggin, a temporary employee; and James Pomeroy, who just came in after leaving the service.

The materials and testing report [laughing], given in the sixteenth biennial report, was indeed brief. But it did show that improvements were made, particularly in prospecting for materials sources, improvements both in the equipment used and the method of presentation of the data so that the contractors could perhaps better understand in detail the nature of the deposits selected. The new equipment consisted of a mechanical soil auger, which was equipped with a number of bits, diameters from eight inches up to twenty-four inches; and, of course, another piece of equipment, used for excavating trenches, was a truck-mounted backhoe. These two instruments replaced the old hand methods, which were slow and often inefficient. And later, during this biennium, I prepared an article describing the equipment and our method of presenting these data found from our investigations to the contractors.

The testing during this sixteenth biennium included the Atterberg limits—that is, the

liquid limit and plastic limit in the on-the-job testing, that is, the testing which we had to do out in the field for immediate acceptance or rejection of materials. For example, while a material deposit might be accepted by the laboratory, sometimes clay seams or bad spots would appear, and the product being prepared by the contractor might show bad, and there was not time to stop the process or make a change by sending the material clear into the laboratory from perhaps as far as three or four hundred miles away. Therefore, it was necessary to inaugurate a field testing program; thus, the resident engineer had on his staff a tester, or perhaps two testers, to keep him informed on the gradation of the aggregates and upon the Atterberg limits. However, a considerable amount of training was necessary to qualify these people, because, as a rule, that kind of a test procedure cannot be learned in just a few minutes. We were remiss, perhaps, at first, by not giving those people enough training, but there simply were not enough men or enough time to do a thorough job. As time went on, however, the more proficient people were separated from those who were not able to do the job properly. This was important, because it meant saving time, and it also meant that the contractor knew he was being checked, and could not get off into some area where the digging was easy just in order to get the material out, and yet the material might not be satisfactory.

In this biennial report, as it affects the laboratory, there was a statement that the total amount of testing and the details regarding the kinds of material were all listed in the appendix. But examination indicates that that particular part of the appendix was omitted entirely from the biennial report, and I was unable to find the original reports to show that.

Now, in the seventeenth biennium, it was a different matter. It was found that 10,121 various kinds of samples were tested during that biennium, and several thousands of tests were made in the field for quality control on the job. However, those numbers of tests were not included in the 10,121. That number was confined to the central laboratory work.

An addition was made to field tests, besides the Atterberg limits and gradation of aggregates, and that was the measurement of air entrained in concrete- mixtures where the addition of air was required, or the addition of an air-entraining agent to the mix. I believe I have stated before the advantages of the air entraining and the way it was finally discovered. However, the initial means of measuring that were very crude. It had to do with making up, or using a large container, and attempting to measure the air through sort of awkward means. Later on, air measurement was made quite accurate by use of air meters. I'll not go into those details at the present time. But the first bulky methods we used were extremely inconvenient.

Of these 10,121 samples tested in the seventeenth biennium, about ten percent of those probably came from organizations and agencies outside of the Highway Department, including the testing we did for the Bureau of Public Roads on the forest highways. I might mention that those highways were under complete supervision of the Bureau of Public Roads; that included the staffing on the job, as well as designing and final inspection. However, the state forces usually accompanied the Bureau people on the final inspection of those highways. As a matter of fact, all highways using federal funds had to be approved by the Bureau of Public Roads before final payment could be made.

I'll describe some of the relations between the Bureau of Public Roads and the laboratory.

In all of the laboratory work, especially that which had to do with federal aid construction, much detail had to be supplied to the Bureau of Public Roads. That, of course, was not necessary in construction which involved purely state funds, nor was it necessary in tests which involved maintenance work, or construction of buildings, and that sort of thing.

First of all, when the materials survey was finished and the deposits selected, details, consisting of detailed tests and sketches, were drawn up and prepared for inclusion into the special provisions for the contractor. These notes and, in fact, the sketches, and the whole bale of wax, so to speak, were submitted to the Bureau of Public Roads for approval. Usually, there was not much complaint coming back for the type of work we did.

The laboratory also had a relation with the Bureau of Public Roads in testing and in test procedures. The state specifications were not the only specifications, of course, which were used in highway construction. But the specifications mainly were those of the American Association of State Highway Officials, which were compiled through meetings and correspondence of the committee on materials, which consisted of all the testing engineers in the states, plus testing engineers and some other officials of the Bureau of Public Roads. We had a relationship, therefore, with the Bureau in the kind of specifications we used for different purposes. There were, of course, special specifications which had to be devised for special problems. Those, too, had to be approved by the Bureau of Public Roads. But if we had enough research and enough data to show that we were on [laughing] the right track, there was usually very little checking done by the Bureau.

We had some disagreements with the Bureau of Public Roads. The state Highway

Department, as a whole, of course, had quite a number. But actually, as far as the testing procedures were concerned, the Bureau of Public Roads did not try to supervise us very much. However, the Bureau did have a district testing engineer for the state[s] of California and Nevada, who would come over and visit occasionally, and we would discuss problems. But there was very seldom very much criticism on our test methods. The principal disagreements probably would have to do with use of excess base, where they thought perhaps traffic did not justify it. They seldom gave us any trouble in other areas; however, there [were] policies which the Bureau of Public Roads put out which some of us in the Highway Department did not agree upon. In later years, I recall one in particular, where the screenings, or, the "chips," as we call it, were placed over the top of the pavement. We in the Highway Department believe that those should be put clear out onto the shoulder area, but the Bureau of Public Roads had them cut off. And the traffic, then, going over those areas, the right-hand wheel, going on and off there, made a little irregularity in the movement of the car. And that was one little item on which we had a lot of disagreement. However, that disagreement was not confined to laboratory people, but to very many in the Highway Department. There are other minor matters on which we disagreed, but I cannot recall very many of them at the present time.

In 1947, when the measurement of air-entraining first came out, we used it in particular on a job from Elko over toward Jiggs. Concrete aggregates around Elko were never known to be as good as we would like them to be, although they'd pass most of the tests. Yet as the years went by, we found the concrete deteriorating. We decided that possibly, there was some action there, sweating action, which probably could be

caused by excess alumina or aluminum compounds, which were in the cement itself, which could be acted upon by sulfates in the soil. Therefore, it was decided to use airetraining to help prevent this, as well as a low alkali cement, in some cases. I was sent up to Elko on this particular job, and Stan Doty was the resident engineer. About the time I arrived and they were ready to pour, it was found that the lumber used in forming was so green that the boards had shrunk, and the dimensions were all out of kilter so that the concrete could not be poured. This, of course, was a problem encountered right after the war because the lumber mills had not been operating, and when they had operated, they hadn't sufficiently aged or dried the material. Therefore, I was stuck to stay in Elko for a while, rather than coming back to Carson and making another trip.

So in the interim, I helped Stanley in his gravel pit. He had a borderline gravel pit. And the contractor was breaking in his son to run the power shovel. This young fellow was lucky to get the material on the truck, let alone sort it out. So I stayed in the deposit and rode herd on this young man to keep him out of the bad material (which was plainly visible to the eye) until he learned how to handle it. I did this while I was waiting for a new forming on the concrete so that we could pour.

Come quitting time at five o'clock, Stan and I usually took a trip up to the south fork, or somewhere on the south fork of the Humboldt, and did a little fly fishing until dark. We had very good luck there. However, I didn't always know what to do with the fish. Stan took some of them, so I took part of them back to the hotel.

A little incident happened there which I'll mention. One day the plant broke down and nothing more could be done (I think it was late in the afternoon); I had gone out to

do some fishing, decided to try another place, but stopped in at a little bar to ask permission to go into that area. There was a young lady in the bar, and she said, "As far as I know, it's all right, but the man who owns the place is a Basque man who has lost his wife. And my boyfriend and I are here just to help him out. We were staying there in Elko 'til he gets his divorce, and then we're going to get married." And she said, "I don't know any reason why you shouldn't go up there and fish, so you go ahead, and I'll take the responsibility." I did that, caught a nice mess of fish, came back, and left them some. Then they wanted me to arrange to come out on a weekend and show them how to fish, which I did.

This young man had been a performer in the movies. He told me he made about seventy dollars an hour to make the Donald Duck noises and those special noises on camera. The girl was a backwoods girl from West Virginia, who had developed a wonderful ability as a draftsman. They became acquainted during the war. He was unable to get into the service on account of a physical defect of some kind. They were acquainted there. In the meantime, he and his wife were fighting to the point where he decided he would get a divorce. I think his wife was a Catholic and did not believe in divorces, but nevertheless, he had come out for that purpose. And this particular weekend, I showed them how to fish with a fly. That girl got ahold of the pole and caught many fish, and neither one of us could get it again. But anyway, I was invited out to their celebration of their wedding, which was to take place the day after the divorce took place, which I did, and we had a champagne party.

One other thing this young fellow mentioned to me, which is quite interesting, he said he had become acquainted, while he was working in the movies, with a black fellow. He said, "I'm not prejudiced. I have

no prejudices whatever about black people.” This man became very friendly, and I found out that he was from, I believe, Dutch Guiana, South America, and he had found a very valuable nonmineral deposit there, and thought it was a good investment for anyone, and I invested some money with him. He says, “You know, I’m sure glad that I did that, because now, about every month I can just go down there to the bank and get a whole wheelbarrow-load of money” [laughing]. Later on, these people visited me in Carson City, but at the time I was not at home. I’ve forgotten their names now.

I became acquainted with Stan’s family, Mrs. Doty, and their little girl Patty. Patty was a brilliant youngster. She could almost read at that tender age. And, the second Sunday that I was up there, we went up to the north fork (I’d never been up there before), and Stanley and I did some fishing until we got run out with the rain. By the following Tuesday, I believe, the reforming had been done, and we went ahead and poured, and I showed Stan and his helpers how to make this particular test.

[During] my trip to Elko, Frank Depp took ill and died, and as I recall, his funeral was held about the time I was up there.

It might be interesting at this time to describe some of the visitors to the laboratory—and we had visitors. Almost every day, there was some visitor from some concern selling highway construction materials, or paints, or expansion joints, or something like that. But there were also visitors who would simply come in out of curiosity. But among the visitors we would receive every year, maybe at least once, were the University engineering classes. And I can’t help but note the difference between those first engineering classes, who came in there before the war had started, and those classes composed largely of returned veterans. The

Carson Brewery was only two blocks away from our laboratory, and I recall before the world war started, the engineering students would come in quite a body, but little by little, there were less and less and less, ‘til finally it dwindled down to just a few, and some of those never came back.

After the war, the engineering students, particularly civil engineers, seemed to be extremely interested, and we never lost a one of that caliber. They were there to get that education; they were getting old, and they wanted to get it, and they paid attention to everything, and stuck right on the job.

During the year of 1947, I was privileged to attend the Ninth Annual Highway Engineering Conference at the University of Utah. There were four of us designated to go on this trip. There was Frank Lyman; J. D. Meacham, construction engineer (Frank Lyman, of course, was chief draftsman); and Julian Glock, who was division engineer at Elko. Professor [A.] Dieffendorf, head of the civil engineering department, managed these programs. They were excellent programs, and they were also sponsored by the Highway Research Board, as well as the Utah State Road Commission and the University of Utah. This particular meeting, in 1947, was a lecture conference on “Technology of Low and Medium Cost Roads.” And my particular part in the program was to take the place of H. D. Mills, assistant state Highway engineer, who was to open a discussion after a lecture by Professor R. L. Sloane of the University of Utah on the subject “Special Soil Conditions,” and then he put “gypsum” in parentheses on that.

The special soils conditions mentioned by Sloane included the action of salt boils, so-called. Now, these were similar to frost boils, which, of course, are made by the expansion of ice, which, as it freezes, draws more water

to it and forms in ice lenses until there's a boil forms in the soil. Considerable trouble was had by Utah and in several of the other states, including some in Nevada, with these so-called salt boils. Certain kinds of salts, those which the chemists call deliquescent salts, have the tendency, when the season changes, say, from dry to wet, to grow crystals. These deliquescent salts, there's two in particular which give a lot of trouble. One is the sodium carbonate, which is washing soda, and the other is Glauber's salt, sodium sulfate. Each one of these salts, Na_2CO_3 , the carbonate, and Na_2SO_4 , the sulfate, when they crystallize completely, will pick up, for every molecule of sodium carbonate or sodium sulfate, ten molecules of water to form the crystals. That means that picking that much water up to form these crystals increases the volume greatly. And it also acts similar to the ice boils in that, as these salts concentrate, they have a tendency to bring more and more of the salt from contiguous areas which may be infested with the same kind of mineral. And it draws those same salts up until the combination of concentration, plus the growth of the crystal, causes a great swelling action. These sometimes can come up suddenly overnight. I had an experience with these in 1941—or, we did, my wife and my sister and me—when we were traveling back to Colorado at the time my mother passed away. We hit one of those, which apparently had come up overnight, unknown to the Highway Department, and it could have been a real bad condition.

Professor Sloane lectured on this, giving, of course, the cause and the effects, and he told us what they had done in Utah in order to correct the situation. It was rather a simple but expensive matter. There's no way to really correct it thoroughly, but what they did in Utah, and I think, what had been done in other states, is to dig up the pavement,

providing the road is paved, and put it to one side, and then thoroughly mix the subgrade soil over a distance of two or three hundred feet, thus disseminating the bad salts over quite an area so that they are thinly dissipated and will not have the tendency to collect, at least not for some time.

Nevada had some problems, and I happened to discuss those. I recall one in particular, over near Lake Lahontan on U.S. 50, where the highway crosses the Southern Pacific railway. We had not put very much fill in there, just enough to get over tracks. And in just a very short time, huge bumps formed there. The maintenance men would knock those down and haul more gravel, but they continually did the same thing, especially in the spring of the year when there was moisture in the ground, lots of it. So later on, we had to dig down deep and destroy some of that and raise that grade and replace much of the subgrade with good gravel. At the present time, that condition has been thoroughly taken care of.

This was an enjoyable meeting, and I think all of us obtained very much from it. There were quite a number of men of note from all over the country, giving their ideas on construction, design, and effects of climate, and so forth, on these secondary roads. And a particular note was made of the use of flexible pavements and the economy, by use of flexible pavements, rather than putting in high cost pavements on these secondary roads.

The following year, I was asked to prepare a paper, which I did, and there were several of us who attended the tenth conference. Those designated to go, besides myself, were, again, Frank Lyman, J. D. Meacham, Julian Glock, and W. R. Perry. As I recall, there was one of the members who could not make it. My paper at the time had to do with the Nevada method of making aggregate surveys and the

methods we used in presenting the data to contractors. This is written out in detail in the paper which was delivered at that time; and in addition to the paper, itself, which explains things quite well, there's several photographs and tables showing examples of how this is done. Rather than discussing that in detail at this time, I will simply refer to those who are interested to the paper, which will be left with the University of Nevada.*

On these Salt Lake trips at these highway conventions, all of those were handled pretty much by Professor A. Dieffendorf, and it's [perhaps] interesting to note that, upon retiring from the University of Utah, he went over to University of Pacific, where he does the same thing over there. He sponsors a civil engineers' meeting, every year at the College of Pacific; that is, he has been doing it for several years. I'm not familiar with whether or-not he is still at the University of Pacific at the present time.

At this time, I think I shall first of all mention that the Highway Department, during each biennium, lists the names of those who died during that period. During the biennium of 1948-1950, among the six names on that list was a man by the name of Frank Garaventa. And I think I'll just give a brief character sketch of Frank.

He first came to the Highway Department about the time [that] Mr. Allen, [who] was the state Highway engineer, was preparing exhibits for the World's Fair at San Francisco. And Frank was noted as a homespun geologist, so to speak. He had a fine knowledge of the places in Nevada where you could find semiprecious gemstones and interesting rock. And Mr. Allen had Frank gather up a number of those things; and in the back part of the lab for about a year's time, Frank Garaventa, and Fred Forbush, and some of the architects were busy preparing those exhibits. That was

not a particular function, probably, of the state Highway Department, but someone had to do it, and Mr. Allen was designated to see that those exhibits were made. And Frank did a very good job of cutting these gemstones and polishing them. And he was a rather interesting person to be with. He never tried to locate any of these areas. He says, "You're better off not locating them. If you know where they are, no one else does, they'll probably be there when you go back to get some more. But if you put up a notice and advertise it, you'll go back and found they've high graded your best specimens."

I had the opportunity to go with Frank on a few excursions, and I found where there were some very nice specimens of what Frank called aladanite. It is a cherty sort of a substance, but I think the name of aladanite was his coining of it, and it's found over in Lyon County. And in the same area, occasionally, you'd pick up a piece of bloodstone.

Frank, after preparing these things, stayed with us for a while in the laboratory, just testing. Then he went out in the field as a field inspector, and he passed away during this period.

I might say, also, that it was a very good exhibit that was prepared by all the various people. Fred Forbush, for example, was a person who could carve in a very excellent manner. And he carved some very nice specimens out of manzanita [and] mountain mahogany. And some of those were exhibited.

I might also mention at this time that, in addition, an exhibit was prepared for the World's Fair in New York in 1940. However, when the material was shipped back there and arrangements were trying to be made to

*See Little papers, UNR Library

get the exhibit, there was trouble between Mr. Allen and the others and the unions at that place. Mr. Allen was not a man to take too much guff from anybody, so he recalled all of the exhibits, and they were turned over to the state of Nevada.

THE EIGHTEENTH BIENNIUM

Now, during this next biennium, the eighteenth biennium, July 1, 1950 to June 30, 1952, I'll mention first of all, there were eight more deaths, including two lab employees, John Curtis, and P. L. Woodgate, and I'll give brief character sketches of those two people.

John Curtis was a one-armed man. He lost his arm in an accident, and he served in the legislature one term. I've forgotten just what term it was. He stood pretty high in political circles, and he was, therefore, at the time given a job in the laboratory. But with that one hand, it was surprising what he could do in the soils test. He did very well rolling out what we called specimens for plastic limit, and he was assigned that job. He had some bad habits, which weren't the best in the world. Nevertheless, he did his job and did it well.

Now, P. L. Woodgate had been working in a bank at Elko, and I think he'd spent much of his life in Elko with his family. And he came to Carson and was employed in the laboratory for probably about twelve to fifteen years, and he was a very thorough worker. He would sometimes have a little problem. He had a health problem, and finally, it was so bad that he lost his only remaining kidney, and he passed away. "Woody," as we called him, Clarence Meginness, and I had a mining claim together. I also had the honor of rehearsing Woody and his son, Mel Woodgate, when they joined the Masonic lodge. All of us missed these people very much.

Now, in the election just prior to the new biennium, the Highway board of directors was changed from Democratic to Republican control. The chairman of the new board was Charles Russell, the governor; W. T. Mathews, a Democrat, was the attorney general; Peter Merialdo, a Republican, was the state controller. And they had control of the board for, I believe, at least four years. There may have been a change in the last four years of Mills's term.

Huston Mills was the highway engineer, replacing W. T. "Bill" Holcomb. Mills held this position until February 2, 1959, when the majority of the board reverted again to Democratic control. But during all those eight years, Bill Holcomb served as assistant Highway engineer. Bill and Mills were always friendly. I knew both of them when I first came to Carson as a teacher. In fact, we all boarded at the same place for a while. And they were both excellent Highway engineers. I gave a brief review of Bill Holcomb at an earlier date, but I might say just a little about Mills. I don't [know] too much about his early life, but I do know he did not go to college. I'm quite sure he finished high school, and he also went to Alaska. I believe he was a surveyor and had done engineering work, and he worked in Alaska. I believe what he did was he was on a survey crew when the railroad was put in up there. And he could recount some sort of hair-raising experiences and rather humorous experiences about that.

He was in World War II, and I believe he served there as a lieutenant at the time the war was over. He came, then, to the state of Nevada, and I first knew him as right-of-way engineer. I think, then he was later made office engineer, and was finally placed in the position of assistant Highway engineer. I believe that was started in R. A. Allen's term

of office, or perhaps before that. I'm not too certain.

During this first biennium under Mills, work had increased considerably in all parts of the state, and especially in some of the larger divisions. There were five division engineers. And in Division One, Vegas; Two, headquartered in Reno; and in Division Four, there were appointed assistants. Those assistants were to assist the division engineer in a portion of his work, because his work included supervision of construction and all of the maintenance in the divisions, and as more roads were built, there was more maintenance, and it was very necessary to have help.

I shall not attempt to name all the changes that we made among personnel in this administration. I will attempt to limit my mentioning of personnel at this time to people in the laboratory. The following is a list of the laboratory crew—that is, the people who worked with us steadily, from about 1950 to 1954, and they varied from about eighteen to twenty-five. There were extra people, of course, who worked in the summer, particularly students; and sometimes, during the quiet part of the year, in the winter, outside Highway employees would come in for training in laboratory work, people who were to become inspectors, or even resident engineers who did not know much about testing. But this is the list of people who were present in June 1953: there was George Allison, in the asphalt lab; Betty Antrim, our secretary; Dale Borden, in charge of the field materials survey crew; Fred Davis, in the soils and aggregate department; Don Fletcher, in the soils department; James Hodge, in asphaltic materials; Hal Kispert, who headed the concrete materials; and L. W. Little, assistant materials and testing engineer; J. H. Morgan, who worked both in the field and in

the lab; F. H. Morrison, the chief materials and testing engineer; Jim Pomeroy, who worked in both the asphalt lab and aggregates; Milton Ross, who rotated between lab and field; Paul Rubin worked in the soils lab; Shirley Perry was on the field crew; James Sullivan was head of the asphalt lab; Perry Thomson was on the field crew; and Robert Whittemore working in asphalt materials.

The biennium of 1950-52 was noted for three events, two of natural origin, and one, man-made: the floods in November 1950, and in the spring of 1952; heavy snows of February and March of 1950 caused a disastrous condition to livestock in Elko, Eureka, and White Pine counties. These two things, the floods and the livestock problem, were the two bad things. The third thing was something considerably better. That was the construction and occupying of a new state office building at South Fall Street, southeast of the state capital building.

Now, in referring to the floods. The Carson River, in November of 1950, became so high that the Dayton bridge was destroyed completely; and the bridge over the east fork, just southeast of Gardnerville, was washed out; and approaches on all five wooden bridges on State Route 37 were washed out. (That's Minden, south.) And at the same time, the Truckee River was very high, and there was damage done to the Glendale bridge and to the Center Street bridge. And Vista was flooded. There were many culverts in the Truckee River drainage basin, which were badly damaged. And Ophir Creek, at the same time, flooded, and decomposed granite was washed down into the Reno-Carson road, just beyond Bowers. It took quite a little while to clean that up and get traffic through. And the Vista area was flooded quite badly. I remember taking a ride over in the Fernley area, and decided that I would drive back to

Reno on U.S. 40. However, when I got to Vista, everything was flooded. There was no possible chance to get to Reno. And here, trees, and buildings, and fence posts were protruding out through the water. If someone would like to read about this and see the pictures, I will refer them to the eighteenth biennial report.

Now, the problem that occurred in February and March of 1952 has been described as "Operation Breakthrough." Very heavy snows fell that year, and the cattle country in northern and eastern areas of the state was really snowed in. It took a lot of money and a lot of thought to get an operation going whereby feed could be obtained and delivered to these starving cattle. But there was quite a lot of success obtained, although some cattle were lost. Joe Meacham of the Highway Department played quite a role in this. He organized practically all of the state's work, but much information and material also was furnished through government areas. The government appropriated \$150,000 to help on this, and they supplied many tractors, and weasels, and several dozen trucks to help plow the way with the weasels, and to get in with hay to the starving cattle.

Now, the other item was the new building, which was to house the Highway Department and everything connected with it in the headquarters. However, other state agencies also were placed in this building. The laboratory was to occupy one section. The cornerstone was laid by the Masonic Grand Lodge, Admission Day 1950, but the actual moving into the place did not occur until the following year. The laboratory section was located in the basement and part of the first floor on the south wing. We had been given considerably more space than we had in the old building. We had a storage space and receiving room in the basement. There was an elevator there whereby many of the

heavy things could be transferred to the first floor above. And right in the basement, we also had the concrete laboratory, and the soils and aggregates laboratory. We tried to confine all the heavy materials and the dusty and dirty work to the basement. Upstairs were the offices. There were three; one central office, where the secretary and her help could work; and an office for Mr. Morrison; and another one for Little. Across the hall were the chem lab, and the asphalt testing lab, and the elevator entrance was a storeroom. All materials which came into the building, that is, all materials to be tested, were sorted and classified and channelized in the room in the basement.

During this biennium, there were a number of special studies made by the lab in addition to their regular routine work, which has been described previously. One such study had to do with making different concrete aggregate, particularly fine aggregate, the sands, for the Reno area. Another one had to do with serviceability of concrete pipe by subjecting various pipe to sodium sulfate soundness tests. This was reported in the *Concrete Pipe News* of February 1952. Another project had to do with what is termed "cracked" asphaltic fuel oil, mixed with Portland cement in stabilizing aggregates containing micaceous matter and clay binders. The term "cracked" is a chemical term, which means that the molecules of asphalt have been altered and usually made more active and more subject to oxidation than are the so-called saturated, or uncracked, asphalt. I can't help but add a few terms which are sort of technical, because you almost have to use them. Another study was made of film stripping the various mineral aggregates used with the regular SC-3 road oil. It was found that many kinds of aggregates, particularly those of an acid nature, such as quartz, have

a tendency to shed the films in the presence of water—that is, the films of asphalt. But I'm not so sure that surface charge has everything to do with it. Sometimes, it is very difficult for asphalt films to replace adsorbed air. Near the surface of certain particles, the air molecules will congregate in great density, much more dense than open air, and sometimes it's very difficult for oily matter to displace those particles. Occasionally, if the particle is first wet with water—or sometimes, [if] the water wouldn't do it, it is possible to get what is called a wetting agent of some kind, which causes the water to first remove the adsorbed air so that it can then be coated with an asphaltic material. These experiments had to do with adsorbed air and water displacement I've just mentioned.

There was another study. It had to do with the evaporation rates of different brands of a certain grade of asphalt from different sources. Although the grades would meet the specification for a particular source, that did not necessarily mean that one source, from one company, or from oil field would be as good as the same grade of oil from another. It was difficult to reach definite conclusions on this, but we did get some indications of qualitative measurements.

Altogether, about 9,000—in fact, 9,519 samples of various highway materials were tested in the central laboratory in this biennium. The principal categories of the tests, by classifications, were concrete materials; and of course, gravel for base and surface aggregates; and bituminous materials; and then the various metals, such as—reinforcing steel, and structural steel, and copper for certain uses, aluminum for guardrail, and things of that kind. Then there was, of course, many miscellaneous materials too numerous to mention.

We were still bothered by problems of about the same kind we had a few years earlier;

that is, there was pressure to build more roads, we did not have enough qualified material to do all the engineering jobs which were needed, and there was a training problem. Dutch Berning, August Berning (we always called him “Dutch”), was personnel manager, and he tried throughout the department to bring in as many qualified people as he could, and if they were not qualified, to have them to go through schooling in various departments to learn the roles in which they were particularly interested. There, of course, were the same old problems of repair and maintenance of roads which had given good service for a good many years and through the war but now were outdated, not only for width and rideability, but were badly damaged in one way or another. These problems are always with us.

THE NINETEENTH BIENNIUM

Now, in the biennium July 1, 1952 to June 30, 1954, we were still faced with the same problems, trying to get enough qualified personnel, train new ones, and secure new equipment where it was needed. The new quarters into which we moved contributed to more efficient work all around, in all departments. Everybody had more space, for a while. However, it must be remembered that other state offices were in there, and they were expanding at the same time. So it was not too long before the Highway Department was again faced with the problem of not enough room. This, however, was taken care of later on, as I will explain.

The upgrading of design occupied much time and work because the highways to be built in the future had to accommodate heavier loads and had to be wider; not only [did they have to accommodate] heavier loads, but [also] more traffic. It constituted

a real problem because the money available to the state of Nevada was always pretty much limited in these years. Now, the laboratory's role in this roadbed design was very important. The roadbed had to be built in such a manner that the loads could be supported, the heavy loads. Therefore, the soils had to be sampled carefully and tested, and each particular type of soil in each location had to be judged, on the basis of test, as to how much base would be required to make the road a safe road and a good road which would last. The laboratory set up the roadbed design, that is, the thickness of the base and the surfacing materials, depending on the subgrade tests. Of course, drainage, and presence of water, and special traffic types all entered into this study.

As we have stated before, some of the duties of a laboratory were to act in—on national committees, on the materials sections, of the AASHO, (that's the American Association of State Highway Officials), and as a correlator for some of the Highway Research Board work. This occupied quite a little bit of time for the top men in the laboratory.

During this biennium, we got some new equipment, not too much. We always had to have new equipment. We were replacing old, worn-out equipment. Our chief expenditures for equipment happened to be materials used in the field, on material survey work, where we would prospect for suitable deposits of gravel, both for base and surfacing material, and film material, and concrete. We obtained a truck-mounted backhoe. Part of this kind of work was described by L. W. Little in a paper delivered at the Utah Highway Conference of Salt Lake City. And an Acker drill for foundation exploration was purchased and a one ton panel truck was converted to a mobile lab for field testing, and it was equipped with everything they needed, including gas for

heat, fans for ventilation, in addition to the testing equipment.

In the laboratory, itself, we purchased a four-tube Saybolt Furol Viscosimeter and a new de Khotinsky-type oven to determine loss on heating.

Not much research was undertaken during this period on account of [the] necessity to keep abreast of routine testing required by the increased design and construction of highways. The design department usually made a preliminary set of plans which enabled the laboratory to determine where the most materials were needed. This was done before the materials survey. After our materials survey had been finished, and our soil samples had been taken and tested and the recommendations turned in to the laboratory, the design department then used that intonation in completing the set of plans. However, the roadbed design—that is, the thicknesses for various areas, and the types of material used—was all put in by the laboratory.

Sometimes it was necessary to swap one type of material for another. For example, as a rule, asphaltic concrete has about twice the supporting value of ordinary, crushed, untreated base. Therefore, sometimes it was found wise (or really, proper) to increase the thickness of the asphalt, although it was very expensive, and decrease the thickness of the base. A good example of that is reconstruction through a town or city. I recall in one place where we were reconstructing a street in Reno. The utilities were located very shallowly. If you would dig too deeply in order to put a big thickness of base, you would destroy the utilities. And that would be an expensive thing, to replace all of them. So rather than doing that, the thickness of base was cut down to a very minimum, and the asphaltic concrete was thickened to give

a support value. In other words, if, say one foot of material is all we would dare to put down on account of utilities underneath, such as electricity, gas, and so forth, if that is as deep as we go, we were not able to put, say, fifteen inches of base down. But what we could do was put just a few inches of base, perhaps maybe five inches, and put in seven inches of asphaltic concrete instead of the usual two and a half, which would give the same structural section, as though you had put down, say fifteen inches of base and three inches of asphalt.

During this biennium, 13,450 samples were subjected to the regular routine tests of all the varieties of material in highway construction. Sometimes we tested many materials for buildings, such as roofing material, and concrete, and the use of special products in some of the buildings. It might be mentioned that the mineral perlite, that is, the expanded perlite, was used on the new state office building as an insulating material. Perlite is a siliceous mineral which contains some moisture; then when subjected to much heat, it expands, sometimes as much as twenty to twenty-five or more times its volume. It is very light in weight, and makes an excellent heat insulator. However, it does not have enough strength to make [an] insulating type of concrete, although sometimes a little cement is added to it just simply to hold it in place.

One event which occurred during this biennium—in fact, it was on February 14, 1954—was a huge rock slide on U.S. 40, just east of the California line. This rock slide put U.S. 40 out of commission for several days. And it took several days simply to get a travel way, and many, many more days to clear the whole thing up and reconstruct there, making benches, so that the recurrence of that thing could not happen.

Considerable effort was made during the years 1950 to 1954, and later, to improve the living quarters, and equipment, and housing for the various crews working on maintenance. Some of these maintenance stations were in isolated regions, and an attempt was made by the state to make those very livable. For example, where there was not a regular water supply; water supplies were developed and piped into the house, and gas was usually used, or oil, for heating, and gas for cooking. Also, it was necessary to increase the size of equipment repair and storage areas in the division headquarters, and quite a lot of work was done at some of the divisions in this category. The department's architects were headed by Jack Cooney, who did the designing of these quarters. Jack continued this work until his retirement, I think, sometime in the late 1960s, or early 1970s.

THE TWENTIETH BIENNIUM

We turn to the biennium, 1955-1956. The Highway board at this time consisted of Governor Charles Russell, chairman; and State Controller Peter Merialdo; and Attorney General Harvey Dickerson. Mills, of course, continued as state Highway engineer, and Holcomb as his assistant. And the headquarters division heads, and the field division, and assistant division engineers remained the same as they were before. However, there was one change. It was now noted that there were four assistant division engineers, instead of three, one having been added at Ely, Division Four.

By July of 1955, a hundred and fifty new employees had been added to the Highway Department due to a fifty percent increase in federal aid funds. During this biennium, construction expanded to the point that 151 miles of new highways, and 305 miles

of reconstructed roads were built. Traffic also increased by about sixteen percent, which, again, called for much additional maintenance. Now, the figure sixteen percent is simply the count of Vehicles, but you could increase the number of vehicles by only a small percentage, and have a lot of damage done if that percentage was composed largely of heavy wheel loads. And the new federal aid bill, which went into effect July 1956, would involve a very significant increase in funds and would result in the beginning of the Interstate system.

Now, the preparation for this new work imposed a terrific problem from the standpoint, again, of securing more qualified personnel and expansion of all facilities to accommodate new personnel and equipment required to carry on the work. The problem of other state agencies occupying a portion of the new state building was taken care of, fortunately, by our legislature, who made correction by authorizing a new state building in the northeast corner of the capitol grounds to take care of this situation.

During this biennium, many conferences were held, and much information was gained through these conferences with people from other states, especially the state of California, where highway construction of four-lane and six-lane roads had been in vogue for some time. One trip was made by eight Highway engineers in September of 1955. The people designated to go on this trip were John Bawden, Melvin Fodrin, Bud Hill, Orrin Walker, Robert Sharpe, and Bill Nagle of the drafting department, and Edgar Boardman [of] the bridge department, and L. W. Little of the testing department. We made this trip in two cars, and we arrived in Los Angeles, I believe, in the evening of the same day we left. We were treated royally by the California division people. They took us

around and showed us the various types of construction, of grade separation structures, some of which were extremely complicated. They took us over the Hollywood Boulevard, and they took us south, and north, and east on new boulevards. Most of the construction they showed us was Portland cement concrete construction. Nevada had never done much of this on account of its cost. We could build many more roads from the asphaltic materials, for the same amount of money, than we could with concrete materials. Nevertheless, knowing that these freeways had to be built to last, and chances are that heavier and heavier vehicles would be using them, we should learn more about Portland cement concrete construction. And we did. We learned a considerable amount. We also were entertained by these people, and I recall one very pleasant luncheon we had. I believe it was in Riverside. And when we left the area, we drove on up the coast and stopped a few places where we observed the construction going on, and we spent a full day in San Francisco, going around with the division engineers there on some of the new construction in San Francisco. This was a very worthwhile trip.

During the biennium, there was considerable work done by the planning survey, headed now by Orvis Riel. Great strides were made in making road inventory studies, and aerial surveys were made by private parties. There was much mapping as a result of these surveys, and also, certain special studies were undertaken. One special study related to damage done in the Fairview Peak-Dixie Valley area in Churchill County by the December 16, 1955 earthquake.

A communications system was built up during Mills's administration by installing radios in vehicles and the construction of mountaintop repeaters. Such communications

are invaluable for rapid communication in times of stress, or trouble, or near calamities, such as huge snowstorms or floods, and at all times they're invaluable for just taking care of common, routine matters.

One very important expenditure was necessary in 1956, and that was brought about to reconstruct, or repair, the December 1955 flood damage. The Carson and Truckee Rivers, again, were in extreme flood stage. Actually, the Carson River carried 30,000 cubic feet per second of water, which was almost double the amount in the 1950 flood. The Truckee carried 20,800 cubic feet per second, which was a 105 percent of the 1950 flood. These terrific volumes of water did plenty of destruction. The Carson River flood destroyed the Dayton bridge; also, the bridge south of Gardnerville; and also destroyed three county-owned bridges, two of 'em in Ormsby County, and one in Douglas. The Ormsby County bridges were the ones leading to the Pinyon Hills, east of the prison, and the bridge leading to Brunswick Canyon. The county, it is interesting to note, replaced the Brunswick Canyon bridge at quite a saving. They obtained the old steel turntable from the V & T shops, and placed that on foundations for the bridge, and it makes a very satisfactory one-way bridge, and is still in place.

The Truckee flood damaged basements [and] their contents of a number of nearby Virginia Street businesses. One Truckee bridge under construction at the time had its falsework and all of the newly built superstructure destroyed. The expenditure was up into the hundreds of thousands, I believe somewhere in the neighborhood of three hundred thousand dollars to repair the damages—that is, the expenditures of the state, the county expenditures not entering into that figure.

One of the big jobs about to be readied during this biennium was relocation and reconstruction of the Clear Creek highway, on U.S. 50 in Ormsby and Douglas Counties. This probably would be the largest and most difficult construction job undertaken by the Highway Department.

During the biennium, the materials and testing division spent considerable time training field inspectors and testers, and some of those people were trained by bringing them in during the winter and putting them through the ropes and let them actually do the testing in the laboratory. As a matter of tact, that was probably the best way to train them. This work was inaugurated by Dutch Berning and backed up, of course, by Mills and the district engineers. And in addition, Mr. Morrison, who chose to spend most of his time during construction season out on the construction, would further instruct these people and watch over them on these construction projects. Mr. Morrison left the affairs of the office mostly up to me.

From fifteen to about twenty-five field laboratories were not unusual during a construction season. These laboratories were not built to be perfect, but they were sufficiently windproof and rainproof so that delicate balances would not be disturbed in performing the tests, and they were equipped with sufficient apparatus, most of it rather simple, to do the control tests so necessary right on the job.

Some of the testing done during this biennium, as well as others, was done for outside agencies because in these times, there was no commercial testing laboratories in Nevada. The Highway Department did this as a public relations thing, and sometimes we made a small charge for the work. It included tests for school districts on new schools. We did considerable tests for the

U.S. Engineers, and the U.S. Navy, and for the Bureau of Public Roads jobs, and for the Indian Service, and the U.S. Grazing Service. They also depended upon us not only for tests, but sometimes for evaluation of construction sites, with respect to drainage and foundations. This was somewhat out of line with the testing materials' usual duties, but nevertheless, someone had to do it, and apparently, we did it well enough to satisfy everybody.

There were many miscellaneous duties during these years, such as serving on committees of the American Association of State Highway Officials and attending many conferences. During the time, there was attempts made to simplify the various specifications on liquid asphalts and penetration grade asphalts. A good many meetings were held on this with members of the Asphalt Institute. Finally, we arrived at some simplified requirements for these tests. As a matter of fact, these tests were used nationwide, although practically all of the work in formulating them, and in arriving at simplified definitions— all of that, practically, was done in the western area. Very little of it was done back East. But the entire country usually adopted what was done. We pioneered in this area in those things.

In this particular biennium, 13,763 samples were tested; 8,500 of these were directly connected with contract work, and the balance related to special projects and to preliminary evaluation of soils and gravels. Now, the tests made in all the field labs were not included. Many thousands of tests were made in these fifteen to twenty-five field labs. They were the more or less simple tests for on-the-job control. In other words, it would take too long to ship samples into the laboratory, have them tested, then ship the results back out. But certain tests, such as sieve analyses

to control the gradation and other simple tests, checking the compaction of soils, and gravel, and so forth, should always be done right on the job.

During Mills's administration, the information was given to all employees that they should be registered as registered professional engineers if it were possible to do so. As a matter of fact, Mills insisted on doing this. Those people who had been in the highway service for quite a few years, and whose work apparently had been satisfactory, had little trouble in registering. They were what we call "grandfathered in. I was one of those. My registration number is Number 124, as a professional highway engineer. New engineers coming out of the University of Nevada, or who had—engineers who had not much experience usually had to take an examination, or were given temporary certificates until such time as examinations were given.

One very important act of the legislature had to do with bringing into being a retirement system for state employees. The Retirement Act of 1947 and subsequent amendments has made it possible for state employees to receive fairly decent retirements. There were quite a number of changes made to the first act. For thirty years, we might say, people in the Highway Department, at least, were working there without any particular incentive except they liked the work, and the pay, such as it was, was keeping them going. Now, a new incentive, to keep employees, the good ones— well, as a matter of fact, you'll keep the bad ones, too—there was an incentive for 'em to stay on the jobs, and if you got a lot of good personnel who've been in there ten or fifteen years, they will not be nearly so apt to "fly the coop," so to speak, and secure better pay and another job in different places.

I can talk about this now that I am retired. At the time I retired, the amendments had

been such as to make it even more desirable. As a matter of fact, I believe there were finally three options. You could retire and take all of your retirement if you were, say, sixty-five years old and had worked twenty years. You could take the full amount yourself. Another option was that you could retire and take approximately half and leave half in case of your death for your wife. Now, that amount would depend upon the age of your wife. If your wife were many, many years younger than you, you would not receive so much, nor would she. In other words, if you were about the same age, the amount you received and what she would receive upon your death would be about equal. And there's a third option, in which you would take approximately two-thirds and leave a third in case of your death for the wife. Whether or not it works the other way around for the women retiring, and whether the husband gets something, that, I don't know. Now that there's Women's Lib, maybe that would be in effect by some kind of an amendment in one of these more recent legislatures.

THE TWENTY-FIRST BIENNIUM

I would like to refer, now, to the twenty-first biennial report. Mr. Mills made some quite pertinent remarks in his introduction. Mills mentioned that this twenty-first biennium, 1957 to 1958, covered the fortieth anniversary of the Highway Department—that is, March 1957 would be the fortieth year and the right month. He refers to this period that we were about to enter at the time, as a period of immense volume of construction because the Interstate program was just about to begin. He made the statement, also, that the first thirty years of the Highway Department consisted mainly in a pioneering proposition

of developing gravel and dirt roads into a 4,300-mile network of paved roads. And the extent and impact of the proposed Interstate construction of 534 miles of four-lane paving, and costing at this time estimated to be about 230 million [dollars] and that it would take thirteen years or more to finish, was tremendous. Now, that would indicate that by November of, say, 1973, the Interstate system would be finished. However, at the time that I am now speaking, in February of 1973, there is still probably as much as fifteen percent to be finished, and I believe the estimate of cost would have to be increased quite a lot over Mills's statement at that time.

And Mills also called attention to increase in costs, not only of cost of construction, but cost of maintenance. Heavier loads on the roads built for lighter traffic were always becoming poorer roads due to heavy, heavy travel, that is, heavy wheel loads, especially in bad weather when the ground was saturated. These breakups are extremely expensive to repair. He also called attention to the need to call attention to the problems to the general public, and he said it was of necessity to do that, and such public hearings had been held during the biennium.

There was some changes in personnel during this biennium. The Highway board, however, was the same as in the twentieth biennium, with Chairman Governor Russell, and Harvey Dickerson, and Pete Merialdo, attorney general and controller, respectively, [were] board members. And, of course, Mills and Holcomb continued as the chief and assistant Highway engineer. There were no changes in the division engineers, that is, division engineers in the five geographical districts. There were some changes in the headquarters divisions, not so much men taken out and transferred as perhaps addition of new headquarters divisions. These divisions

are listed for reference on page six of the twenty-first biennial report.

Now, the twenty-first biennium saw the beginning of Interstate freeway design. And I must mention right here that one headquarters division, that is, the planning survey division, while it had been in operation for quite a few years, now was involved with the very great chore of extrapolating, we'll say, data when prognosticating what kind of a road we would have to have, say, in twenty years. Look into the future, [and] instead of building for what traffic we have now, build for traffic in the future. Therefore, it was one of the functions of the Highway planning survey at this time, under the guidance of Orvis Riel, to enlarge the studies and to include road life studies and to begin photogrammetry and special studies, origin and destination studies, in order to estimate the kind of roads we would have, and where to spend the most money because of the heavier traffic. This was something much more than in the normal inventory, and mapping, and traffic, which were the original functions of this particular division. Aerial photography was undertaken by contract in order to aid in mapping. However, the alignment over which this aerial photography took place was furnished by this planning survey division.

There was increase in work in all headquarter divisions, as well as in the five geographical districts. Design, especially, had to be increased. Training schools had to be established. It was really on-the-job training, because there were not enough professional engineers available to take charge or to actually get into the full swing of the thing without considerable on-the-job training. Because of the lack of engineering help, it was necessary in some cases to hire professional engineering consultants for some of the projects. As I recall now, some of the

large freeway projects were designed by these professional engineers. I recall in particular one between Verdi and Reno was done by that kind of personnel.

Another change during this biennium was the introduction of prestressed concrete bridge members, something which had not been undertaken by the Nevada Highway Department heretofore. Heretofore, most of our bridge and concrete work had to do with relatively small bridges across streams and what few rivers we have, and a few overhead grade separation crossings. Now, with the introduction of Interstate four-lane highways, the structural design requirements were multiplied many times. And the volume of the concrete work in bridge and grade separations almost doubled over those of the twentieth biennium.

There were seventy-eight projects during this biennium designed, and most of those were put in under contract during the biennium. Some idea of the increased volume [of] construction projects can be had by examining this twenty-first biennial report. And there were sixty-eight contracts awarded at a total cost of \$28,490,000 approximately, for about 529 miles of highway. Now, those were the contracts awarded, and thirty-nine of those were completed during the biennium at a cost of \$13,775,000 approximately, with a mileage of 237. And in addition, there were twenty-eight contracts which were awarded prior to the twenty-first biennium, which were completed during this biennium at a cost of \$9,797,621, with a mileage of 225.7. Now, six of the contracts were for 37.679 miles of four-lane roads. The new Clear Creek highway was one of the four-lane highways which entered into this.

Now, there was increase in all of the divisions, that is, increase in the work loads. The right-of-way department had to enlarge.

The accounting department had more work, the IBM section. Communication equipment had to be purchased and distributed throughout all vehicles, for both maintenance and construction engineers. The design department had to enlarge some of its functions. A modern reproduction layout had to be purchased, and more regular drafting equipment had to be purchased. And the equipment division, that is the Reno shops, had to be enlarged. The legal division had been in force, but this, also, had to grow. And during this two years, there was inauguration of a safety division. A man by the name of Joe Moore, with much experience, was placed in charge of this division. There was also an emphasis placed on public information by furnishing schools with road information, and continuing the publication on an expanded scale of the magazine *Nevada Highways and Parks*.

Now, in returning to the materials and testing, and research division, the increases in work loads during the past several years was great. In this particular biennium, there were 19,534 samples run. Some of those samples had only a very few tests made. Other samples, such as a gravel sample, for example, might require as many as six or seven different varieties of tests, the sieve analysis, of course, and abrasion on the coarser materials; and tests of the fine materials passing Number 40 sieve; to test it for plasticity and water absorption; and also tests to indicate its behavior with asphalt, whether or not it was hydrophilic or hydrophobic—that is, [would] asphalt films stick to the rock in presence of water, or would they be replaced. Other samples, perhaps, would have only one or two tests. However, an asphalt sample might be subject to as many as five or six tests. But the number of samples, alone, was the number quoted. The number of total tests

would probably run up into the many tens of thousands. However, this number of samples simply applies to those tested in the headquarters laboratory.

During this period, as many, or perhaps a few more than, twenty field laboratories were equipped, and personnel [were] trained to operate certain control tests right on the job in these field laboratories. Then, in addition, through the cooperation of W. O. Wright, who was division engineer in Las Vegas, a branch laboratory was established there and fully equipped to do many of the tests. It was difficult to ship heavy materials several hundred miles to the Carson lab and get results back in time, without holding up some areas of construction. Thus, materials like testing of concrete cylinders, base and surface aggregates, and check tests on those things, tests of some of the asphaltic materials, the more critical tests, with respect to the time element—all those things were now done in the Division One, or could be done in the Las Vegas laboratory. And the tests run in these field labs and in the Las Vegas laboratory are not included in the 19,534 samples mentioned above, all of which were tested in the headquarters laboratory at Carson City.

Robert Arkell was placed in charge of the Las Vegas laboratory, and he did a very good job, but as I will state later on, as time went on, he decided he would like to come up north, and he left that laboratory and was replaced by another man, which we will tell about later on. Certain things could not be tested in Las Vegas because the equipment was not available to do so. Breaking of reinforcing steel bars, for example, all had to be done in Carson City, and there were many other qualitative tests and chemical tests which could not be done down there. Bob had a part-time helper at first. Later on, as I remember, the part-time helper became a full-time helper, and

there were one or two more employees added during the heaviest part of the construction season.

I have mentioned that the volume of testing during this biennium had increased considerably, I believe by forty-one percent, as I recall. That meant we had, now, from twentythree to twenty-six people in the central laboratory at Carson City on full time. Now, extra help was put on in summer. Usually, these were college students or perhaps high school juniors or seniors actually doing work which needed to be done, because that time of the year was the real rush time. Now, there were other people in the laboratory whose names do not appear on personnel, but they were resident engineers and inspectors, or new people who would come in, usually during the slack times, for on-the-job training in laboratory matters. Many, many of those at odd times went through the laboratory during the slack season, in the wintertime.

During this period, some changes were made in subdepartment heads. Ed Marriage was brought in from the field and into the central laboratory, and was put in charge of the materials survey crew. Jim Sullivan, who had been in the asphalt lab, in charge, was brought into the office, I believe, in 1955, as an assistant. It was necessary to have an additional assistant. Mr. Morrison spent most of his time during construction season out in the field. But the volume of work in the office piled up so badly that the chief assistant testing engineer could not handle all the incoming visitors. Sullivan was given the job of handling salesmen and other incoming people, and also, assigned the job of reviewing quite a number of the tests, and he did an excellent job of ordering materials and supplying the central laboratory and the field laboratories and the Las Vegas laboratory with reagents and equipment. Hal Kispert

continued as head of the concrete and cement lab, and Norman Noteware continued in charge of the chemical laboratory. And Paul Rubin continued as head of the soils and aggregates laboratory.

In the asphalt laboratory at this time, there was Robert Whittemore, who had quit the teaching business, and George Allison. And upon occasion, some of the other lab employees would be transferred when the work load became tough. So Robert Whittemore was then given the job of taking over administration of the asphalt products laboratory.

During this biennium, there were quite a few you might call extracurricular duties, such as acting as go-between for organizations such as the Highway Research Board, and testing divisions of the American Society for Testing Materials. Conferences were held at various times, and it seemed to be my job to handle the laboratory end of it for Nevada. As a result of some of these conferences, significant changes were made in specifications on a good many materials, particularly on asphaltic materials. These conferences had been going on for a number of years, but the principal idea was to group these asphaltic products, that is, the paving asphalts and the liquid asphalts so that there would be a minimum of varieties, yet enough varieties to satisfy the needs of all the people involved. In the West, the eleven western states, and the asphalt industry, did most of the work, as I have mentioned before, in categorizing these materials and developing the required tests. Much research was done on this, particularly by the state of California and by the labs of the producers.

Of the many conferences held, there were two of particular importance. One, in June of 1956, I will not describe that too much in detail, but another, February fourth and fifth of 1957. This conference was called the Pacific

Coast Conference on Asphalt Specifications, including producers and consumers. After attending the meeting and taking part in it, I made up a series of notes describing the things that had been done. These notes will be available to possible future researchers who are interested in studying changes in asphaltic construction materials. And attached to this series of notes is a specification requirements for asphaltic cement, as finally adopted at this meeting.

The meeting was held at the Sheraton Palace hotel in San Francisco. And in attendance were practically all the California producers, such as Shell, and Standard, and Union, and others; and there were also two producers from Utah, namely the Phillips Petroleum Company and the Utah Oil Refining Company; and the Carter Oil Company from Montana. And there were six state highway departments represented, that is, represented by materials and testing men—Arizona, California, Idaho, Nevada, Oregon, and Washington—and also Regions Seven and Eight of the physical research division in the Bureau of Public Roads, and the north and south Pacific divisions of the United States Corps of Engineers.

The Asphalt Institute, had hired a professor at the University of California by the name of Barney Vallerga. Barney acted as moderator of this particular meeting, and conducted all [of] the meeting through the two full days.

The first thing on the program was to find out whether or not there were any corrections to the minutes as read, that is, the minutes of the meeting of June twenty-fifth, and there were none. I will not try to mention all the topics taken up here, but it was concerned, principally, with penetration grade asphalts, that is, the hard asphalts which are used in heavy traffic pavements. And these asphalts, were boiled down to five grades instead of

as many as eight or nine, or more, which had been previously used. Then, some of the tests were mentioned which might be significant, and some of the tests which were the result of research done by the producers, and particularly by the state of California, and some by the state of Washington, and others, were discussed, and their values were weighed, and the meeting took votes on what they would use and what they would not use. This is quite technical, and I will not try to explain it here. An agreement was also made for the different state laboratories to have the various results, that is, where each of, say, six or seven or eight or more laboratories learning the same kind of a test to determine its value, the data from those several laboratories would be taken over by the California people and run through necessary machinery, using statistical methods, and would result, probably, in coming up with something that could be used by everyone.

After adjournment of the principal meeting of February fifth, at four P.M., there were two brief meetings held. One of the brief meetings was held by Mr. [Harold] Allen, of the Bureau of Public Roads testing division, and the six state representatives. And another meeting was held by the Nevada representative alone and the producers. That, I will describe a little later.

But I think I should mention the names of some of the people taking part in this particular meeting. There was Mr. Cliff Woodruff, representing the Asphalt Industry; and Mr. Gagle, of the Phillips Petroleum Company; Mr. O'Hara, testing engineer for Arizona; Mr. Francis Hveem, chief testing engineer, state of California; and Mr. [John] Skogg, an assistant of Mr. Hveem's; Mr. Fred Scott, of the Union Oil Company; Gene Webber, of Richfield; Mr. Harold Allen, chief of testing division of the Bureau of Public

Roads; Leif Erickson, chief testing engineer, Idaho; and L. W. Little, assistant materials engineer, Nevada.

The private meeting between Little and the producers had to do with penalties. Of the six states, and the Bureau of Public Roads, and others attending the meeting...by the way, this meeting was audited, also, by quite a number of county and city engineers, all interested in what was going on. As a matter of fact, cities and counties and other organizations usually adopted specifications and test methods which were promulgated or researched and which were finally brought into being as the last thing by the industry and states. But nobody except Nevada, that is, none of these western states had been assessing a penalty when the products did not meet specifications. It had been the policy in Nevada to assess a ten percent penalty when the samples taken at delivery point were not up to specification. Now, there was some question on where you would stop on that, how much would they have to be out of specifications, and those things had to be discussed and worked out.

This short meeting with the representatives of the oil companies really resulted in a very friendly settlement. I was asked to review Nevada's stand on the matter, and after that, it was generally agreed by all the oil companies that the policy had not materially bothered them during the past season. They all agreed that efforts were being made in all directions, as far as the oil companies and consumers were concerned, to get the materials on grade. Now the fly in the ointment seemed to be that the carriers, who had no direct relation with the consumers or the producers—they're simply carriers; they could contaminate by having leftover products of a different kind in their tank trucks when a new product was put in. And the matter of sampling, sampling

by oil thief, or sampling simply by using the spout, all those things would enter into it. At the end of this short meeting, the oil companies agreed that this ten percent loss wasn't affecting them too much, and they thought it probably could be continued. So the meeting was ended harmoniously.

This matter of penalties was again brought up in a meeting of the Asphalt Institute and the state of Nevada engineers, that is, the resident engineers who have to handle these things out on the job, and the field divisions engineers, construction and maintenance engineers, and, of course, testing engineers. In 1958, I believe it was in winter or early spring, there was a special meeting and several papers were given by members of the oil companies, and I had one entitled "Specifications of Asphalt Products After Shipment: A Consumer's Viewpoint." And this matter of contamination and penalties were discussed in my paper, and I am leaving that, a copy of it, for possible future use of researchers in asphaltic products.

YEARS AS CHIEF MATERIALS AND TESTING ENGINEER

THE TWENTY-SECOND AND TWENTY-THIRD BIENNIUMS

In turning to the period of the twenty-second and twenty-third biennial reports, from around January 1959 to July 1962, we find a period of great changes. A rather significant change happened during the twentysecond biennial report, the Highway board changed due to an election, and that, of course, changed some of the department heads. Now, during this twenty-second biennium, the first part of it, from July 1, 1958, to January 5, 1959, we had the same board, Charles Russell, chairman; and Harvey Dickerson and Peter Merialdo, attorney general and the controller, respectively, as members. And, of course, Mills as the state Highway engineer, and Holcomb, the assistant.

Now, after the election, there was a change, so that beginning January 5, 1959, and on through several years, the Democrats were in complete control. Governor Grant Sawyer became chairman, and attorney

general was now Roger [D.] Foley, and the state controller [was] Keith Lee. And February 2, 1959, then, Edward Pine was appointed state Highway engineer, and W. O. Wright, Otis Wright, who had been division engineer at Las Vegas, Division One, was appointed assistant. However, as stated before Edward Pine apparently saw greener pastures elsewhere and decided to resign from the Highway Department. Therefore, effective March 16, 1960, there was another change, and W. O. Wright was elevated to state Highway engineer. A further change, due to the rapid growth, it was necessary to split the duties ordinarily assigned to an assistant state Highway engineer. Now, we had two, and they called them deputies instead of assistants. John E. Bawden was elevated from chief draftsman up to deputy Highway engineer. His areas covered most of the local headquarters goings-on, such as advanced planning, design, and some of the other functions, of safety, and a good many of the others. Reuben Eldredge, who had been a resident engineer, and later on, assistant

district engineer, was elevated to the other deputy job; his area was the construction department and field department.

Now, the laboratory is kind of an orphan; it had to go somewhere, so it has usually been placed with the construction. The laboratory's functions are such that they serve, and are served, by practically all divisions in the Highway Department, from the preliminary planning, design. And prior to contract letting, their information must always be presented to contractors. During the contract, they have direct relations with the construction as it goes on—the training of inspectors, and so forth. They also, of course, are connected with matters of finance, and personnel, safety, and all these other things. We were an orphan, and yet, we covered an entire field in some respects, we laboratory people. But we were looked upon, I think, in a good many cases as an orphan, and, "What the heck do we do with this outfit? Well, we've got to put 'em somewhere." So they usually come under the district engineer or deputy engineer who was in charge of construction and field operations.

Now, at the change made January 5, 1959, both Mr. Mills and Mr. Holcomb, of course, were out, and both retired. They had served in the state Highway Department more than thirtyfive years, and were two meritorious public servants. They were very much dedicated, and got along together very, very well. They were friends for a long, long time, and they divided their duties, and sometimes worked long hours.

Bill Holcomb—"Billy," as we called him, almost immediately began practice as a private engineer in Las Vegas. Well, after about a year of that, he joined the firm of Wells Cargo, contractors, and was with them as superintendent and administrative executive for about three years. Then in 1963, Bill

became director of Public Works for the city of Reno, a position which he held until August of 1969, when he again retired from public service. It is well known that someone who is retired and immediately goes to work again is limited in what he can earn in his new job without losing his retirement. And the kind of work that Billy did would soon put him in a position where he could no longer receive his retirement. When he went back to the city of Reno (cities and state belonged to the same retirement system), then he could again work up more years of retirement, and upon that retirement, of course, receive a better pension. Billy worked right up until August, 1969, when he again retired, as I have said, but he passed away December nineteenth, just nine days after his seventy-fifth birthday.

Huston Mills, very shortly after his retirement, served as a professional engineering consultant with the Isbell Construction Company. That probably was not a steady job, but he was called on in conferences intermittently, and I believe that lasted for about two years. He then settled down to his retirement in Carson City with Jane, his wife. She took ill and passed away about two years ago. The house was too much for Mills, in his advancing age, to take care of, so he sold his home and moved to an apartment in the north part of Carson City.

Mills and Holcomb, both, were interested in sports. Mills, however, I don't believe, was quite as interested as Holcomb. He liked his home and garden—had a cat he called "Oz." Oz was short for Oswald, and he always had a few anecdotes to tell about Oz. So his old-time highway friends and others thought that he ought to be given a little honor for his eightieth birthday in April of 1972. Mary Rochon (secretary to seven Highway engineers at this date, 1963) organized the thing, and we held a nice dinner and gettogether at a place east

of Carson called Poochie's then. [They] may have changed their name at the present time.

Now Ed Pine came into the Highway Department upon the retirement of Mills. I had known Ed for some time. In fact, he went to school with me a short time in his freshman year— probably was algebra and general science. He was a native Nevadan, born in Rawhide, and his mother was living at the time, I believe. He was an orphan; however, not a full orphan. He spent the years 1925 to '29 in the orphans' home at Carson City and attended Carson schools. The last year he spent there, of course, was his first year in high school, which happened to be my last year of teaching in Carson High School. Ed was an excellent student. He finished high school in Hawthorne, Nevada, attended University of Nevada—obtained a Bachelor of Science in Engineering in 1938.

During World War II, he was in the service at the University of Washington, and involved in the studies of sanitary engineering. Upon his return to Reno, he went with the Associated General Contractors, and headed that organization as executive director for about eleven years before he became a Highway engineer, February 2, 1959. His resignation was effective March 5, 1960. Apparently, he had good reason for doing so. He enjoyed the work with the contractors more than he enjoyed the trials and tribulations of being a Highway engineer; possibly there was better pay—conjectures on my part. Nevertheless, he became president of Isbell Construction Company in 1960, served until 1961. Then he went to the University of Nevada, first with various titles, as engineer and business manager, and in 1970 was made vice-president, which office he holds at the present time. Ed has always been active in community life, and in all branches of Masonry. He was the Grand Master of the

Masonic Lodge, he was a past potentate of Kerak Temple of the Shrine, and he has been head of many other Masonic orders.

Otis Wright took over, advanced from assistant Highway engineer to Highway engineer March 16, 1960, and finished out the biennium June thirtieth, of the same year, and continued as chief Highway engineer until his retirement in 1966, on June thirtieth. Otis had forty-four years of service with the Highway Department. He was a native Nevadan, born in Reno, attended Reno schools and the University of Nevada, but did not finish because of a death in the family. He started out in the Highway Department as a chainman, and advanced the hard way, through seventeen or eighteen years, through party chief and resident engineer on several jobs. On December 7, 1971, which was Pearl Harbor Day, he was made assistant division engineer in Division One. J. M. Murphy was the division engineer at the time.

In the meantime, during this seventeen or eighteen years, he had spent one year outside the Highway Department, when he worked for the Bureau of Public Roads. When Murphy resigned, about 1953, Otis was advanced to the top job, which he held until advanced to assistant state Highway engineer in February, 1959. He was then made state Highway engineer in March.

Otis was not a healthy man. He had been complaining of abdominal troubles for quite a few years. However, he had tremendous courage, and he held up remarkably well. After his retirement in 1966, his health gradually deteriorated, and he died of cancer in 1969.

Otis had outside interests, mainly in sports. He was especially interested in baseball and football, and I can remember he always had on his desk two little statues, of an umpire, and a batter and a catcher in a big argument.

That was rather a comical thing, but it was a good kind of a little notion for a baseball fan. It always brought a lot of comment.

Otis also worked with boys. I believe he did quite a bit with—it was either Boy Scouts, or a 4-H group, or something of that kind. No doubt, it had a reference to baseball, or something of that kind.

Otis's widow, who is of Danish descent, lives in Reno. I first knew her as a ticket agent at the old V & T office in Carson City. I do not remember when it was that Otis married her. I believe Otis was playing baseball on some team around here when I first knew him, about 1925 or '26.

Now, during this time, the time of the changeover, the two deputy Highway engineers had separate jobs, as I have explained. And there's a list in the biennial report, of course, of all these various division engineers, as they are now called—that is, the people at headquarters and the equipment divisions; and what we used to call division engineers, the title, has been changed to district engineers. This happened as of June 30, 1960. And those district engineers out in the field I will list at the present time, because there were some changes in just a few years. G. B. Brockway was made the district engineer in District One at Las Vegas, and Vernon Sharp, who had long been a resident engineer, as Brockway had been, was made the assistant. The two big divisions were Division One, the Las Vegas area, and Division Two, in Reno. And J. L. Hancock, of course, was the district engineer in Reno (he had held that job for some little time), and Jack Parvin was elevated from resident engineer to assistant district engineer in District Two. At Elko, there was Julian Glock, the district engineer. And Henry H. Mayer, "Hank," as we called him, was appointed district engineer. Over at Ely, in Division Four, W. R. Parry, the district

engineer, was given an assistant, who was Michael J. Colletti. And Paul Robbins was made district engineer in Division Five at Tonopah. A new division was put in because of the freeway, calling for so much extra work. Winnemucca was taken out of Division Three and it was made into Division Six by taking a part of the territory formerly held by Division Three, and part of it which had formerly been held by Division Two, thus dividing up the workloads more equitably. All these people, who were division and assistant division engineers, usually made their way there through the route, coming up from chainman, or surveyor, or as assistant of some kind, and resident engineer.

Now, I'm not going to, at this time, describe and name all the material in what we called the division engineers in the Highway Department at that time, and there were about fifteen of them. But certain changes were made, and when we come to the next biennium, the twenty-third, I will list the names of these department heads.

I think, now, I should turn, perhaps, to a description of some of the work done by the testing department.

The materials and testing division, as it was now called (it was formerly the testing department, and, I believe, at one time, materials and research department), of course, is responsible for many operations which have been described previously. In this particular biennium, there was a tremendous increase in the volume of work. And we tried to classify the work into four principal divisions, that is, the work in the headquarters laboratory. In the meantime, of course, there had been established in Las Vegas a regular laboratory in which they could do many of the things pertinent to that district in order to save time. But in these four categories that is, the asphalt section, soils section, cement

and chemical section, and the cement and concrete section, there were a total of 16,965 tests run in the headquarters laboratory. That is, samples run. Now, the total number of tests would be much greater than that, because a certain kind of samples may have as many as three to seven or eight varieties of tests.

The asphalt section had seven categories of tests. There were 6,322 of that. The soils section [which] also included gravel and base materials, had eleven sections. There were 7,841 samples in the soils and gravels section. In the chemicals section, the different things are too numerous to mention, but roughly, chemical analyses were run on things like cementing agents, Portland cement, some asphalts, paints, metals, various things. And the actual number of samples run, while it amounts only to 284, there's a tremendous amount of work in some of those.

Now, on what they call the cement and concrete section. That includes, for the sake of convenience in the laboratory, the different metals which had to be tested for structural strength. We called the testing machine we had in order to do that a universal machine. It could be used in tension to pull metals apart, as well as in compression to break concrete cylinders and other things. And there were thirteen categories of materials, which were completed in that particular laboratory, a total of 2,518 samples.

Now, down in the Las Vegas laboratory, they tested just certain things. They couldn't test everything. They did control tests on liquid asphalts, and the penetration grade asphalts, and emulsified asphalts. And they tested their own concrete cylinders made in that district, and did some of the tests, like sieve analyses, on concrete aggregates. They also did some of the simpler tests, or check tests, of gravels and soils, and several miscellaneous things. And they accomplished their tests on 2,797

samples during the year. And this was done by one man with occasional helpers, one or two, which made a total, for both laboratories, of 19,762 samples for the year.

This was not necessarily a banner year, because at this particular time, the department was growing and each year it seemed there were more things to do, and more things were done. The headquarters laboratory—there were several new pieces of equipment installed. It included a mechanical mixer for mixing asphaltic mixtures, a mechanical kneading compactor, which was a special instrument to give the right kind of compaction to an asphaltic sample before it is pressed into a cake. In other words, we tried to simulate the compaction which traffic gives to an asphaltic pavement. It also included a ninetythousand-pound capacity hydraulic press. And we had new ovens, a new Toledo balance, and it also included equipment for running the Hveem stability test. (Francis Hveem was the chief testing engineer for many years in the state of California Highway Department.) And also, a mechanical spader was ordered. That is another piece of apparatus for giving the proper compactive effort to various mixtures.

Otis Wright, the state Highway engineer, wrote an introduction to the twenty-second biennial report. Although he had been in office only a short time, it befell him to make this write-up. And in that, he emphasized the rise in activities in all the areas, and especially in the planning and construction of the Interstate system. He mentioned, among other things, the increase in cost per mile of maintenance, stating that it was double that of 1950. I believe the comparison there was \$892 in 1960, as against \$412 in 1950. Then he went back as far as 1940 to state that the average cost per mile was \$263. Now, the reasons for those increases are quite obvious. Of course, wages were rising; more expensive

equipment was being used. But better roads were constructed, wider roads, and traffic was heavier all the time, and doing more damage to roads. Then the building of four-lane highways not only was much more expensive than the old two-lane highways, but it was also more expensive to maintain. There were four lanes from which to remove snow, four lanes to check for potholes and patching, and four shoulders, instead of two, to clean up and grade. Otis also noted that there were, altogether at that time, 4,492.98 miles. That included all the types—primary, secondary, and interstate roads. That was at the end of the biennium.

I think I shall mention at this time the service awards. Every two years, service awards are made. I haven't mentioned the names of people for every biennium, but this time, I think I shall, and shall also name the retirees or some of the retirees, at least, for this period.

In the thirty-five-plus years, there was G. F. Armstrong, who was maintenance superintendent for District Two at Reno; and Ernie Cross, who had the same job at Elko; J. A. Glock, and J. L. Hancock, division engineers; Ernie Pohl, who was the chief accountant for many years at the state Highway Department; and Paul Rawls, the location engineer, who had been with the department many, many years; and Bonnie O. Reid, who was the chief clerk and "payroll doll" as some of them called her, and she had served those many years in the Highway Department. Those who had served from thirty to thirty-five years were Charles L. Brown and Reuben E. Eldredge, both of whom had been resident engineers, and Eldredge recently appointed as deputy Highway engineer; L. W. Little, materials section; F. H. Morrison, materials section; Dale Rose, a resident engineer; and Herbert A. Squires, a resident engineer who, I believe,

was either an assistant or was to be appointed assistant soon.

The twenty to twenty-five category were the following: E. T. Boardman, bridge engineer; Joe Boniface, who had been on maintenance; G. B. Brockway, division engineer, Melvin Fodrin, one of the principal draftsmen; William Gibson, who had done a lot of work on location, and had also, during wartime, been a resident engineer; Jack Greenhalgh, who was in charge of the car pool in Carson City; Denton Hayes, a former resident engineer and district engineer; Al Kinney, former resident engineer and chief draftsman; Louis Koontz, in the right-of-way department; E. A. McMurtrey, a resident engineer and location engineer; Cy[ril] Miles, a location engineer; and Zita D. Meder, who was an office girl; Stanley Sundeen, who had several jobs in the Highway Department, as office engineer and draftsman; C. F. Smith, an inspector; Paul Robbins, a resident engineer and assistant district engineer; and Jack Parvin, whose duties have been described before; and Alan O'Dell, assistant bridge engineer.

Then there were those people who retired this time. There was Fred Davis, from the laboratory. Fred lived in Reno, and he was one of the Reno commuters, and he did that for all the time he worked in the testing laboratory. And there was Estelle Box, who worked in the accounting office, I believe. Her husband, Charles Box, had worked in the Highway Department for many years. And Estelle went down. I don't know that she spent a full twenty-five years, but she did spend enough time to retire. Then there was A. "Dutch" Berning, Jr. Now, Dutch Berning deserves a lot of credit. He started out in the Highway Department, I believe, shortly after high school, about the time the Highway Department was organized. And he advanced through the department as draftsman, and he

finally was appointed as what we called a field engineer in those days. The field engineer's job was to go out, and practically stay out all the time, and check the different jobs and the resident engineers for progress, and would make up the progress report. And when the job was done, he would check with the resident engineers and the contractors to see that everything was in order. Dutch did that for a long, long time; then he was appointed as personnel officer in the Highway Department, a job which he held until his retirement.

And about the time he retired was the time when the personnel job began to be quite a thing. The state personnel board had requested a lot of changes be made, and the legislature had passed laws whereby the old "spoils" system was pretty much outlawed, except for the top men in the various state positions, and the *hoi polloi*, or the run-of-the-mill employees could advance on the basis of merit. Dutch did a lot of work in his long service. And he was also noted as the director of the Carson City Band. While Dutch directed the band, he also had his cornet with him. He was a very good cornet player, and he sometimes joined us with his cornet. Dutch also was district engineer for a while down at Las Vegas. I believe he served there for about four years.

Then there was Charles Blaker, who was one of the shop foremen over at Reno; Lou Bloxham, who had been in the field a great many years as a maintenance man, but he retired from the laboratory where he had been employed as a man on materials survey, running the digging equipment.

And Joseph D. Meacham. Joe had been a resident engineer, a division engineer, and he had been placed in charge of a lot of the field work in the Highway Department the last few years. There had never been a chief construction engineer, but Joe more or less

served as chief construction engineer and a chief maintenance engineer. Later on, these jobs were separated, and a big thing was made out of them.

Some other changes were made about this time. For many years, Frank Morrison had been the chief materials and testing engineer, and I had been his assistant. As the years went on, he became a little less active physically. As a matter of fact, he had a hearing handicap, and some of his superiors thought perhaps it was too dangerous to leave him out there too long. He was too valuable a man to retire, so they brought him into the Highway Department where he would not be susceptible to having traffic bump into him when he wouldn't hear them coming and they gave him a title—chief research engineer. He worked at that job, I believe, for about two or three years before he retired. He was given special assignments, and he did a lot of work on preparing specifications.

As I have stated before, there was a growing amount of detail concerning personnel, in general, all through the state. In this biennium, and in the following biennium, 1961 to 1962, there were many changes. However, I must say this about the Highway Department's biennial report for 1961 and '62: it was really cut down to a bare minimum. It was so brief, in fact, that there was not very much said about any of the departments, very little about the laboratories. The administrative officials of 1961 and '62 were, of course, the same board of directors, Governor Sawyer, Mr. Foley, and Mr. Lee. The department heads were W. O. Wright, Reuben Eldredge...Wright was Highway engineer, and the deputies were Eldredge and Bawden. Now, the headquarters division heads and the district engineers were pretty much the same as in '61 and '62, but there were some changes.

The tremendous growth during 1961 and '62, and modernization of the highway

program were the things emphasized by Mr. Wright in his introduction to this twenty-third biennial report. Work increased considerably. There was forty-two contracts awarded, and the total bid amount on those contracts was \$38,462,483. And that involved construction of 334 miles of highways of all the types—primary, secondary, and interstate. And in addition, there were two division offices constructed, and two maintenance buildings.

Again, the comparison in costs per mile of maintenance was emphasized. The four hundred-dollar figure for 1950 was increased to six hundred for 1955, nine hundred in 1960, and eleven hundred for 1962. In actual construction during this period, the freeway program, with 106 miles, either completed or placed under contract, led all others, and that expenditure would involve \$13,600,000.

And again, the employment of engineers and technicians increased, and there was a twenty percent rise in employment over that of June 1960. Now, the number of new personnel, although still insufficient (we could have used a lot more trained people), but regardless of that, there were enough of them that it caused overcrowding of quarters. So there we were again, needing new quarters. This led, of course, to planning and awarding of a contract in June 1962, for a new Highway building to be built down at the south end of Carson City, adjacent to Highway 395 and 50. This was to include a new four-story Highway building, and a new laboratory, which would be built as a separate entity. New maintenance buildings were also included, not in this particular contract, but they had to be constructed, also.

At this time, I'm going to list the names of the division heads, most of whom were in Carson City, and again mention the names of the district engineers. First, in the various division heads, there was A. G. Kinney, who

was assistant deputy Highway engineer. He had control of all the preliminary work, including design. And D. H. Hayes, Denton Hayes, was made administrative engineer, then assistant to the three top men. Orrin W. Walker was made chief road designer. Orrin had been in the design department for many years. And E. T. Boardman, of course, was the chief bridge engineer, a position which he has held for a number of years. And Orvis Riel was chief planning survey engineer, a job which he had held ever since Holcomb had held it prior to Billy's advancement to state Highway engineer. Orvis Riel held this for many years, and he did a marvelous job. And James T. Wallace was the chief right-of-way engineer. Jim lived in Douglas County. He was well known all over the state, as most right-of-way people were, because of the travel they had to do. Robert J. Potter, of Carson City, was made the chief counsel. Frank Quilici was the Highway equipment superintendent. Frank had spent most of his years in engineering with contractors. He had taken over the Highway equipment superintendent job. Victor W. Clyde, who had gone through many years as a resident engineer—he was a student of mine in high school, and a very good one. I don't believe he ever missed an algebra or geometry problem. He was an excellent student. Victor was elevated to construction engineer. However, in just a short time, I believe about two years, he switched over to chief maintenance engineer and didn't retire until about 1971 or '72, I believe. H. A. Squires was given the chief maintenance engineer job. L. W. Little was made chief testing engineer; F. H. Morrison was made research engineer. And W. H. "Bill" Gibson was the location engineer; Ralph J. Otini, the traffic engineer. (These people who had been in the field and were promoted to these jobs, most of them moved into Carson City with their families.

Mrs. Gibson was a teacher in the Carson schools. One of her daughters, Theresa, played in the Carson City Band alongside me.) Stanley Sundeen was still office engineer. And Henry L. Clayton took the place of Dutch Berning as personnel officer. And Clarence Eiche continued as chief accountant. Donald L. Bowers was the public information officer, and, of course, had quite a lot to do with the publications of the Highway magazine, which was introduced, I believe, about that time; and the safety director, who had been appointed previously, Joseph A. Moore.

Now, all these people, except possibly Moore and a few, had quite a number of people working under them. These division heads, as they were called, were all located in Carson City, except Quilici, the Highway equipment superintendent, and the equipment yards were in Reno, placed there for several reasons. Shipping of the heavy equipment and repairs were made easier because of availability of materials and help in that area.

Now, the district engineers, although were mentioned before, showed some changes. That is, the geographical district heads. G. B. Brockway and Vernon Sharp still had the Division One, as district engineer and assistant; Jack Parvin was made district engineer of District Two in Reno, and Michael Colletti, assistant. And Paul E. Robbins was made district engineer at District Three in Elko, and he had, of course, as assistant Henry H. Mayer, who later became district engineer when Paul was transferred somewhere else. And Julian Glock was placed as district engineer at Ely. Owen Joseph was brought in as his assistant. Charlie Brown remained a district engineer at Tonopah; and Dale Rose was district engineer, assisted by Ace Howard, both of whom, of course, were ex-resident engineers in District Six at Winnemucca. Tonopah, District Five, was the only one

which did not have an assistant. And as far as I know, it still does not because it does not cover quite as much highway area, although it covers a great geographical area, as the other districts.

The growth acceleration of the program increased administration problems tremendously, and personnel, in particular, needed better ways of handling. The Highway Department was not alone in this, of course. Growth all over the state required different methods of handling of the personnel, which have been mentioned to some extent before. But to get a wellfunctioning personnel department, quite an effort was made by the state legislature, and some good people were put in there, and the time had come to get all state jobs classified, with descriptions of the jobs, and qualifications set out for appointees or those who were to be appointed to the different jobs. This thing began to take place before Dutch Berning left the department, but they were increased under Hank Clayton. I have available, somewhere, a description of the chief testing engineer's duties, and another description of his qualifications required. These descriptions were requested by the state personnel board, and they had to be made out in all categories, especially in the chief department, and assistant chief heads.

Now, during this biennium, the twenty-third biennium, the testing report was in such a condensed form that full data, like I had been giving before, was not available. But the staff was almost doubled, and the work load almost tripled. And much time was spent in training field personnel, and what we called on-the-job training, and installing improved field testing equipment. Now, I believe it was about this time when quite a number of portable field laboratories were built at the Reno shops and equipped with all the necessary testing devices for a

particular job. Some of the big jobs would require almost two of those, because there was coming into vogue new tests. Compaction was very important, compaction of subgrade. And the only way to control that is right on the job. And nuclear methods were soon to be introduced, which would save a lot of time at that. But in the meantime, the old, slower compaction cylinder methods had to be used. Then there was sieve analysis necessary for immediate control of the gradation of the various aggregates, which involved the use of mechanical shakers. I recall when we started out on that, in the field tests, everything was done by hand.

The Western Association of State Highway Officials would meet almost every year in the offices or somewhere where there was plenty of room to hold the meeting in a particular state. Now, in 1961, we had a meeting in Las Vegas, and I happened to be chairman of the materials section. This is called the WASHO (Western Association of State Highway Officials) conventions. I had written a paper of some length, but I saved my part of it 'til last on the program, having all other papers taken first. The paper I had prepared had to do with a new policy put in by the Bureau of Public Roads, called the "Record Sampling Program." This was a program whereby samples of finished products, after they were placed on the road, were taken and tested, and that was so-called record samples. But heretofore, we had done something like that, but the samples were not taken by the materials section, or by the Bureau of Public Roads. They were taken by the field engineers. And we called them "finals," final samples. Now, it involved much more work, and the testing department was specified as the department to take these samples. The Bureau of Public Roads, presumably, was also to be on hand. However, in Nevada, the Bureau of

Public Roads personnel were so limited that that could not be done.

There were memoranda coming out from Washington, D.C., and sometimes, in two or three months, they may have as many as four memoranda. And there were conflicting ideas in these, and it made it difficult for us to really know just what was wanted. So I had, I believe, about a twenty-three [page] paper on that, and I had written to all of the Western State Highway officials. I believe I covered fourteen states, including Hawaii and Alaska, and answers to a good number of questions were received from those people. These papers had five sets of summaries of record sample questionnaires, with the testing engineers named, and the state, and the title, and a good many questions concerning record samples. These varied somewhat from state to state, and reliability of the record samples was also varied. But it was as nearly complete as it could be obtained. I doubt very much if anyone else in any section of the country had gone into so much detail on record samples.

I thought, because my criticism of the Bureau of Public Roads was rather severe, I should notify the local head engineer of the Bureau of Public Roads, Forest Hall, which I did. And he apparently thought my notification and description of what I had done should be sent to Washington, D.C., which it was. And to my surprise, when it came my turn, in Las Vegas, to give my paper, immediately afterwards, instead of adjourning the meeting, someone got up and said, "The Bureau of Public Roads has something to say regarding Mr. Little's paper." And Mr. Williams, who I believe he was head of the construction department, or something (I can't remember his title, now) back in Washington, D.C., got up and gave a rebuttal to my paper. Nevertheless, I received many compliments from the engineers present,

and in a few months, the Bureau of Public Roads had straightened out their memoranda regarding the record samples, and I believe I had something to do with getting that straightened out. This confusion was finally relieved. The rebuttal, as I say, was given by Mr. Williams, who was, I believe chief of operations of the Bureau of Public Roads.

As I said, we had fourteen states, but the state of Alaska had been busy with something else, and they did not answer the questionnaire. And Texas did not answer it because they had twenty-five district engineers, and the district engineers had been taking care of it, and the chief testing engineer said he just didn't have time to get all the information back from those twenty-five people. I do believe him because I've traveled through Texas, and I recall when we did, we came in at the far western end, and it took us better than two days to get across to Louisiana. It is a large state.

There was also a need in the testing department for a geologist. And I believe at the beginning of this biennium, we did advertise for a geologist, and interviews were had with a number of people. Tom Cordova, a graduate, a Bachelor of Science in geology, the University of Nevada, was our first geologist. And the duties of the geologist were quite numerous. His special jobs were to study drainage and water problems, problems regarding slides and slopes, the degree of slope due to the nature of materials, and also be capable of discerning faults and fault scarps so that highways would not be placed parallel, at least, or over the top of, in a parallel way, such places. In some cases, it was necessary that they might cross at right angles to a fault, but it was certainly [the policy] in an earthquake-prone area to keep as far away from the bad fault areas as it could be done. He also was given the task, in some areas where gravels

and sands were scarce, to assist the materials survey crew in locating suitable deposits, also classifying rock work in especially difficult areas so that the contractor might have some advance information as what to expect in order to make up his bids. This work was done very well by Tom, and he was also given the privilege of spending part of two days each week to go back to the University and work out his master's degree, which he succeeded in doing, shortly after which he left us, and we got another geologist [laughing].

Tom, at the present time, is in a private engineering firm. He is one of the members. I believe his firm calls themselves the Earth Science Consultants. He has had a lot of jobs on this. As a matter of fact, after I retired from the Highway Department, I did one job for the Earth Science Consultants when they were busy somewhere else.

It was my job to attend hearings on boards, not only for testing and geologists, but I was roped in on the landscape proposition, and we hired landscape people. And as a matter of fact, I served on several boards. This was something new, something which we had not done heretofore.

THE TWENTY-FOURTH BIENNIUM

I think I shall refer to the Nevada Highway Department organization chart. The fiscal years 1963-64 showed many more things in detail than did the previous biennium. At the present time, under the administration of Otis Wright, there was considerable reorganization, and there were actually three deputy Highway engineers, one for the office operations, and one for the field operations. John Bawden was put in charge of the office operations, and Reuben Eldredge was placed in charge of the field operations. Now, in addition, there was an administrative

engineer who had charge of quite a few of the things, such as public hearings, data processing, data processing supervisors, the chief accountant, personnel officer, office engineer, and secretary of the board, public information officer, and program engineer. All those came under the administrative engineer, who happened to be Denton Hayes.

Now, with respect to the testing department, that had been placed under the deputy state Highway engineer in control of field operations. There were at least eleven or more subdivisions under the field operations. Actually, the materials and testing department should not be placed in one particular place. It's a service organization, which really takes care of projects all through the Highway Department. I really believe we did as much in the office operations for design, and a right-of-way, bridge, as we did under construction. However, they had to put it someplace, and I presume the easiest place was under the deputy engineer, under field operations.

The design area, office operations, consisted of a deputy Highway engineer in addition to the chief deputy. That happened to be Al Kinney. And under his control was the right-of-way engineer, chief bridge engineer, and the chief road design engineer. However, design was broken up, usually, into about three parts—the Interstate roads; regular, federal aid roads; and secondary roads. That also had the chief planning engineer, who was Orrin Walker, and the chief traffic engineer under the office operations. However, like I said before, there was very much laboratory correlation with these people. We obtained from the planning engineer information concerning future traffic. Traffic would be projected ahead, say, ten years, and the wheel loads, presumed to be using a road to be built ten years ahead, was much better information than building for what we have now. We

paid quite a lot of attention to building for the future. And, of course, with the right-of-way engineer, we were always in contact with him on account of securing permission to use certain deposits, some which were on federal land, and some which were on private land. And the right-of-way department, as a rule, made those agreements, and those were placed in the special provisions. We also placed in the special provisions detailed drawings of material deposits which our field crews had located, showing the depth of the test holes, and tests of each of the test holes. There might be as few as five or six test holes; there might be as many as twenty. And these were all shown in detail for the benefit of the contractor. And that operation came under the deputy state Highway engineer in charge of office operations, and also, to some extent, under the bridge engineer, and, of course, the chief design engineer.

Now, the part we had to do with field operations directly, other than our materials survey—our materials survey all had to do with the preliminary work of getting the plans ready, and getting our information for the special provisions to go into plans. That does not come under the deputy Highway engineer under field operations, but it was a big job, and we did it.

Now, under the deputy state Highway engineer for field operations, there were as many as eleven or more varieties. There was construction engineer, maintenance engineer, location engineer, and they happened to put the materials and testing engineer there, and the equipment superintendent—which is logical, that part of it—and the safety director, and the communication supervisor, the architects, and all six of the district engineers and their deputies, and the chief of survey parties (which seemed a little bit odd; it seems those chiefs of parties, in doing preliminary

work, would have a direct contact with the deputy Highway engineer on the plans and specifications), and, also, the various resident engineers. And there were a lot of engineers in the state. July of 1962, there were probably, oh, nearly a hundred resident engineers, present and past.

I might mention at this time one division in particular, which was quite new, but which became absolutely necessary, and that was the legal division. For a time, we had only one engineer there. Now, it was necessary to have two deputy attorney generals, a chief counsel or assistant counsel, and two legal research assistants. Condemnation suits became more numerous as the Highway program increased, and it was necessary to consult continuously with the right-of-way department. The legal division would prosecute all department claims (roughly at this time, about a hundred per year), and also defend the department against claims by the contractor (of approximately twenty-five per year). Also, they review all the works put out in special provisions, and specifications, and other documents, checking for legality.

Later on, the chief administrator, who was hired later, acted as chief, or chairman, of the claims board. Heretofore, the claims had been handled by the construction engineer or the chief deputy Highway engineer without much reference to anyone else. And several problems which had been handled in this manner were questioned quite highly, so the Highway engineer and the board of directors decided a claims board should be formed for handling Highway contractors' claims. Now, this was done, I believe, just after the twenty-fourth biennium. I believe that was done early in 1965, and I will describe that later.

Now, in checking over the 1963-64 report, there were some changes made in division heads. Now, division head—the

term "division" nowadays applied to divisions of the Highway Department headquarters. Heretofore, it had applied to the division engineers out in the state, five or six divisions. And those out in the state were now changed to "district" engineers.

Now, the new people, new changes in the division heads in the headquarters, was Victor Clyde changed from the construction engineer to maintenance engineer (I think that was done at his request); and G. K. Wolverton, Gerry, as we called him, was made construction engineer. And a newly appointed training officer was placed in headquarters, George E. Smith. He had quite a lot to do with training, because we found now, that [if] we take new employees in, they should go through a series of training, and it was arranged by Smith that those employees would take special courses, if time were available—that is, at the University—or would attend lectures, but also would spend a certain amount of time in each of the various divisions, such as the testing, construction, data processing, and so forth. So that was George Smith's job.

Another man was put in, Remo Albertini, as a supervising internal auditor. Some of the lesser division heads were Curtis Folz, who was in charge of data processing. He was a data processing supervisor. And Jerry J. Quinlan was the chief storekeeper, in charge of supplies, of course. And Gilbert De Bard was the Highway communications supervisor.

Now, there were also some changes out in the six districts— or, in some of the six districts, and all of these men who I am about to mention are ex-resident engineers, unfortunately, I think, the resident engineers get very little publicity, and very seldom get their names in biennial reports until they have been advanced to some executive position. But those fellows, really, are under the gun;

they're out there where they have to see that the contractor does what he is supposed to do, and they're constantly supervised off and on by their district engineers and by the Bureau of Public Roads people, and the district engineers and the Bureau of Public Roads people don't always agree on what should be done, when it should be done. He is really under the gun. And when he has had several years' experience in that, I am sure he is certainly qualified to become a chief district engineer. At this time, changes which were made since the last biennium: Jack Parvin was put in as district engineer in District One at Las Vegas; and Owen Joseph an ex-resident engineer, of course, was put in as an assistant. There were two assistants, in fact, in District One in Vegas. The other was Vernon Sharp. The duties were divided between Sharp and Owen Joseph. And Mike Colletti was advanced from assistant district engineer to chief district engineer in Reno in Division Two. And Ace Howard, Ace A. Howard, a former resident engineer, was made assistant in Reno, and he took care principally of a lot of the maintenance operations. And Edward Marriage, who had started out right out of high school in the field, and had worked his way up to resident engineer for quite a few years, and then was transferred to the laboratory for a while, in charge of the material survey scene. Edward was made district engineer in District Four at Ely. And Joe Souza was made assistant district engineer in District Six, the new district with headquarters in Winnemucca. And all the other district engineers and assistants remained the same as in 1961-62.

Now, I must mention that it cannot be my intent to reasonably describe in detail all the various departments and their functions. This would be a task, I think, quite beyond the scope of what I presume to do, nor do I intend

to enumerate all the construction projects. Rather, I will give most of my attention to the materials testing division, its functions, and the people who worked in that division. Nevertheless, from time to time, I will describe some of the personnel in the various departments, and some of their functions, and the overall growth, and will note the introduction of new departments as the Highway Department began to grow. Again, significant growth and changes were notable in this past biennium. I have mentioned some of that previously. And the field division heads, there was quite a little change in there, which I have also mentioned.

Now, with reference to the testing division, there was growth in the number of employees. For example, the regular, full-time employees in December 1962 totaled about thirty-five, and near the end of the year, 1964, there were forty-three. However, in the summertime, the numbers were increased due to addition of college students, and some high school students who had finished their junior year. But from about the tenth of June 'til the first of September, those people gave us quite a little help, and in the meantime, they also received considerable training. They were both boys and girls. In this August, of 1964, the payroll contained fourteen people who were either students or trainees.

Now, during this biennium, Frank Morrison, who had been chief testing engineer for a number of years, and then was brought in from the field and made research engineer, and given a separate office—he retired, and I believe he had approximately thirty-eight years, or maybe even thirty-nine years of service. He worked for two years as research engineer, covering certain problems, and then he retired. A retirement party was given to Mr. Morrison by the lab employees on the ground floor of the testing lab. The Highway engineer,

and his assistants, and many division heads, as well as several former lab employees, were in attendance at Mr. Morrison's retirement. He had had a rather difficult time through his life on account of being hard of hearing. And I believe that is why he preferred the field operations to staying inside and taking care of all the details in the laboratory, itself. He left that pretty much up to me.

In talking a little bit more about the testing, the program [of operations] was increased greatly between July 1, 1962, and July 1, 1964, and there was a sixty percent gain in personnel over the two-year period, and great emphasis was placed on what was called a record sampling program, which I have mentioned. It was developed in the previous biennium. In the past, there [were] two men to sample the subgrade material; now there were three crews of two men each engaged in this activity. And to provide more accurate coverage for the widespread construction program, gravel sampling crews were increased from two to four. The freeways, you see, tool so much more gravel, with their four lanes and heavy construction that did the old moderately heavy construction of two lanes.

For example, a gravel put, in the earlier days, when we were building two lanes without paying too much attention to construction, if the soil were fairly good, for say, five miles, might require sixty thousand cubic yards. Now, a freeway, built over the same soil, using the data required for the heavier traffic which we have, and for the greater volume, and greater width, these same five miles might require as much as five hundred thousand cubic yards of material. So it was necessary to do a more thorough, or more nearly thorough job of prospecting and securing more samples, and sometimes, this involved quite a waste of time. Sometimes, the areas

we thought might be good proved to have so very little material in them; it did not pay to do that, and we'd have to take a longer haul and develop greater amounts of materials.

Additional employees were assigned to conduct extraction tests on asphalt, that is, the built roads were cored, and the asphalt was taken out, and the proportion of asphalt determined, and the proportion of gravel. Then there were other new personnel given the job of making tests on factors relating to quality of paving materials. New equipment was installed to provide a more accurate means of analyzing other construction materials in addition to gravels and soils, such as steel, and Portland cement. And personnel from both construction and testing crews had to be trained to handle the control and record sample activity connected with the increased use of cement-stabilizing base materials.

Cement stabilization had not been in vogue very long, but we found it a very good thing to do. For example, a gravel which had considerable plasticity, that is, clay, was never satisfactory, because as soon as the moisture content got up to a point where what we call the plastic limit was reached, heavy loads would tend to disturb and cause bumps or hollows in the pavement. That plasticity, which is caused by clay, could be altered by adding some Portland cement to the roadbed and mixing it in, which produced a very great amount of stability.

I have described briefly some of the functions and happenings in the testing division. There's quite a lot more can be said. This division worked very closely with the design and right-of-way divisions in preliminary work which had nothing to do, particularly, with the construction department, and later on, with the bridge department, and, of course, construction engineers and testers in the field under the

construction department. We also, in these earlier days, did quite a lot of work for towns, school districts, and counties, and the Indian Service, also the Bureau of Public Roads, and for various consulting engineers in both a service and an advisory capacity. There were small charges made, which really never did actually cover the costs. Later on, when professional engineers started laboratories and testing in Reno and Las Vegas, we recommended to these outside agencies that they contact those people. We, ourselves, sometimes hired those people. We hired Porter and O'Brien at one time to make a materials survey of quarries out of Reno. They lost a lot of money on this because the rocky material had so many fractures in it that they lost diamonds out of their diamond drills, but they did finish the job for us.

Now, in the past, we could send two men out, and they did a pretty good job on sampling subgrade material. But now, with the Interstate system coming up, and so much more construction, it was necessary to use sometimes as many as three crews of two men. Then the same crews also could be used in prospecting for the aggregates. Then it was necessary to employ one man as a full-time delineator to sketch the material deposits and determine the amounts in the deposits, and maintain records of the test holes, draw them up to be placed in the special provisions so that the contractor could see that. Nevadans, I believe, pioneered in this operation. Our contractors always knew exactly where they could get the materials, and whether or not there was a royalty, and if there were a royalty, how much it would be. Other states adopted a similar system, but I believe Nevada was the pioneer in this.

Then, of course, it was necessary for the laboratory to increase the training of certain crews who never before had done anything with, say, Portland cement stabilization. And,

of course, we always had to train the testers out in the field because the control tests had to be done right on the job. Unfortunately, those people were not always permanent people, and there was quite a turnover in those field crews. Wages were not high, and we were continually forced to do some training.

Additional tests were required in the asphalt section, and some tests were devised to determine the stability of different mixtures and void factors, density, and proper thickness, and eventually, a lot of work was done in a new soils and foundation section, which was equipped with proper materials. And, of course, the chemicals section of the laboratory was greatly expanded during this period. We had a very good chemist, Budd Rude, who had considerable experience as a private chemist, and we acquired a Beckman spectrophotometer and other instruments permitting determination of certain elements in minutes of time, rather than taking hours by the old-time wet analysis. And facilities were required for rapid and accurate analyses of steel and other metal alloys. During the next few years, additional equipment was put in the chemical laboratory, and the chemical laboratory was enlarged. I will describe some of that later on. Growth of this division is characterized by a more nearly complete and accurate control of the materials used in highway construction, as well as an active and progressive research program.

In the beginning of this period we hired a soils engineer. I served on [the] examining board for quite a number of positions, not only for testing, but for the landscape people. I presume, because I had taken an interest in landscaping and gardening, that I was chosen to be on the board for these landscape people. A man by the name of Don Collins was hired after examination by a board to take over the soils testing and research work.

A good many miles of highways of all types were built or [under] construction during this twenty-fourth biennium. Also, there were a good many employees hired in the period 1961 to 1964, many more than there had been before. On page fifty-five, [of the supplement to the twenty-fourth biennial report], for example, in describing the construction and maintenance crews between the years 1961 and 1964, there was an increase in that time of 364 employees, which brought it up from 733 in 1961 up to one thousand ninety seven in 1964. And in the planning and design, the growth increased from 203 to 292. That's an increase of eighty-nine employees. And in the administrative services, such as accounting, and data processing, office engineers, storage and mail, personnel training, and so forth, there were twenty-two gained, from seventy-seven up to ninety-nine. In all, these areas I have mentioned, a total gain since 1961 of [475] employees.

Now, there were capital improvements under the way, also. Growth of the work accomplished by the testing division, during [the] 1963-64 biennium is notable. The headquarters lab tested 23,626 samples, performing a total of about 145,852 tests. You see, the number of tests of a sample varies considerably. Once in a while, it is only a single test; then, again, as many as fourteen tests per sample. The average number of tests per sample, however, averages slightly more than six.

Now, the laboratory down at Las Vegas had been installed prior to this time, and Bob Arkell had come up north to be with us, and one of our employees, Jim Pomeroy, decided he wanted that job down there. So Jim was sent down. And then this last biennium, Jim and his crew, which was a relatively small crew, tested 4,533 samples, making a total number of tests of 21,263.

Now, in 1963 on up [to] '64, the capital improvements in this particular biennium amounted to about \$2,300,000, and they included completion of the equipment shops in Sparks, a great enlargement there, and a new maintenance station and motor pool in Carson City, and, of course, a new laboratory down on lower Stewart Street. And in addition, the new main building was under construction down there, and it was partly finished by the end of the biennium. And there was about \$3,500,000 spent on the items I have just mentioned, and also, on the new building being constructed.

Now, I spent quite a little time, when that new building was being constructed, and also, when the Carson City High School was being constructed, on studying the underground water conditions. This was all done, of course, gratis, as far as the high school was concerned, and we found quite a lot of underground water which had to be drained away, and I made a recommendation as to how that could be done. We also discovered almost an underground stream under the new large Highway building, and there was no way to get rid of that water except by putting in sort of a well and a pump, and pumping it out. And to this very day, that requires quite a little work. It seems, in that particular area of town, the water is fairly close to the surface. We had no trouble in the laboratory with ground water because we didn't have a basement in the laboratory. We built on top of ground, and there was considerable fill put under the lab at the time.

The testing department was ready to move in the fall of 1964. The testing building had been finished to some extent, and in this new building, we had one main office which would house as many as four or five stenographers and girls, and adjoining it, around the edges, were six smaller offices, rooms for other

purposes—for example, an office for, perhaps, the man on materials survey, another one [for] the man who did quite a little research work, and an office for the chief testing engineer, an office for the assistant chief, and, perhaps an office for a future soils engineer, and a small room which the girls could use as a restroom and coffee and lunch room.

Then, in addition to that, in the aggregates lab, we had room for quite a few operations. We had one area which could be more or less sealed off and take care of air currents, where Atterburg limits, as we called then, could be run, and other tests could be run which were affected to some extent, especially in weighing, by air currents.

Then another room was set aside for sieve analysis so the dust could be kept down and fans and hoods were obtained for removing dust. But also, certain fans and hoods were placed in the chemical laboratory, in the oil lab, and in the stability laboratory to remove bad fumes and dust. We were quite careful in doing this, and were very successful in doing it. I remember, when we first started out in the laboratory of the basement of the old Heroes Memorial Building, we had it so smoky in there, it was almost impossible to perform your work correctly. The 1936 or '38 legislature, whichever it was, many members of their ways and means committee were brought over, and we demonstrated the thing, and by doing that, we got a new laboratory built at that time, which was a private laboratory for a few years, and then another story built on the top for the planning division, and a connection with many other divisions, so it really wasn't as private as we'd hoped. I just happen to mention this. And, of course, the new laboratory, which was put down back of the southeast corner of the capitol, all the entire Highway Department was housed there, but the laboratory had a

part of the ground floor and second floor on the southerly wing for a laboratory purpose. But still, we were not all by ourselves. We had other people mixed in with us. Now, we had our own laboratory, aside from the main Highway Department.

In addition to what I've described, for office work, I said we enlarged the aggregate laboratory. And on the north end, and on the east side, a large receiving and storage room. Also, on the north end, there was a large room which we did not equip. We left it absolutely open. That would be the new soils lab, and a lab for installing certain machines on research. Later on, Mr. Collins was given that laboratory, and in conference with several of us, he ordered the equipment he needed, and we let him go ahead and develop it. It was badly needed.

At this time, I was no longer able to spend much of my time in designing the base and surface materials, and the paving materials for the roads. I had done that almost exclusively for about as many as twenty years; that is, I set up the roadbed design, based on climate and future traffic, and tests of the soils that we made, and tests of the gravels which we were to use. I could no longer do that because I had too many other things in the fire, so to speak. So Mr. Collins had that particular department given over to him, and he had many new tests, some of which he had invented himself, in which to do it. And we equipped that laboratory with a stabilometer apparatus, and other apparatus to check water absorption, and swell of wet soils, and ovens for drying. In fact, we installed quite a large oven to dry many moist samples. They should be dried pretty well before you attempt to test them. If they're moist, they do not sieve very well. Then, of course, as I've said before, we had fans which would pick up dust. The people working in the laboratories where there was

dust were not any more subject to dust in their lungs. Don Collins was allowed, thus, to equip the soils lab after these conferences much as the way he desired. And he was given some two to four employees whom he trained.

And then, in the western part of the new building, except the office, was given over to a modern chemical laboratory. But on beyond the soils laboratory, in the eastern end, we put two more laboratories. One was the stabilometer lab, which was used to check stability of various asphalt mixtures with gravels. (That stabilometer was invented by Francis Hveem of California, and there were many refinements on it as the years went along which aided in compacting the sample similar to the way it would be compacted on the roadway, and testing it under various conditions.) As I said, there was one other on the easterly—that would be the southeasterly corner of the main building. There was quite a large oil testing laboratory, with side rooms for holding samples and for weighing out of the heat; and dust was removed, and smoke was removed, of course, by proper hoods. And this laboratory was much larger than the one we had had up in the main building.

Now, over on the westerly side, in addition to the large chemical laboratory, was the furnace, the heating units, which were very well controlled, and air conditioning units. And a hail ran almost the full length of the building, the hallway. We used part of that hallway for storage of partly tested samples, or some samples which really should be held in the files for quite a little time before they're disposed of. Especially, they should be kept in the files until the job which they represented came under contract.

For example, we might go out a year ahead of time and make what we call a materials survey, take soil samples and study the soils, and from that data, we would get information

which would allow the use of certain kinds of gravel and certain thicknesses for the type of traffic it was to have in the future. Then we would find these gravels and subject those to tests. But we kept the tested samples until the contract was let. That used quite a lot of space, and sometimes, after the contract was let, we retested some of those samples for special uses.

Budd Rude took over the new chemical lab. He was a welltrained chemist, and he had begun his employment with the Highway Department in 1962. Norman Noteware had been our chemist, but we now used Norman on a special assignment in one of the offices.

Adjoining the chemical lab, and just south of the heating and air conditioning plant was a concrete and cement lab, equipped with machines for testing concrete and mortar specimens and reinforcing steel. And there was certain rooms where temperature and humidity could be controlled and certain storage areas. Then the two hundred thousand-pound capacity testing machine for breaking cylinders and pulling steel apart was taken down at the old laboratory by a crew from the Reno shops and reassembled in the new building. These workmen did a very fine job at that time.

I might state, that, at this time, I had seldom taken an extended vacation while with the Highway Department. I usually took a day now and then, and here and there, but I had never taken an extended vacation. However, in June 1962, Mrs. Little and I took a seven thousand-mile tour of the southern and eastern United States, and we also got roped in on the marriage of a young woman who had come from North Carolina. In fact, there were two girls who had come from North Carolina a couple years before, and they were homesick, and, at first, could not cash their checks. Mrs. Little helped them

out on that, and they came to us with all their problems and troubles. In fact, they did more so of that than our own daughters. And we thought a lot of these two girls, and had made arrangements for them to go down to Sacramento and study their chances to go to Europe on a two- or three-year term in the Air Force or other places where they could teach American people. And the youngest girl did that, Elaine Moore, but the oldest girl whose name was Jan Kimble, had become engaged to John Meder of Carson City, and their wedding was held early in June. We had to postpone our trip because Jan's parents could not come out for wedding due to the fact that another one of their daughters was being married at the same time. So I acted as the father of the bride. We gave them the dinner after the practice, and I conducted the bride down the aisle. They were married up at Lake Tahoe. However, there were some things about that not so good. She had a very wide dress, and the aisle was narrow, and at the time they took the picture, I was looking down at my feet to keep 'em off her dress. That was not so good [laughing].

However, we did make our trip back East, about the middle of June. That was quite a nice trip. We went down through Las Vegas, and stopped and saw Boulder Dam and a brief view of the Grand Canyon (I had been to both places, but Ruth had never been there), and we went on down through Arizona, through— a planted area, an area which was planted through all kinds of cactuses, and on through to New Mexico [El Paso]. We then left the area, and, as I recall, it took us two and a half days to traverse Texas from the point where we started 'til we hit the Louisiana state line. We did stop over in San Antonio. I had been quite a student of what happened at the Alamo, and as luck would have it, we stopped to find out where it was, and looked

up, and we'd stopped right at the Alamo. We spent probably an hour visiting the Alamo, and saw the bullet holes. I had written quite a little story about it when I was in the eighth grade, from studies I had made. I was very much interested in the Alamo.

Then we left. When we got over to Louisiana, we went into the first town of any size (it was a name I can't recall at the moment), and before we made Florida, I saw a sign leading to an area called New Iberia. It was off the main road, but we decided to go down there because we'd learned there was some very interesting things in New Iberia. And when we got there, we found that there were. It was made into a sort of a park, and there were many bayous and water bodies. They had alligators in certain areas, and they had the white birds—I can't remember now; they were not flamingos. They were a bird which is becoming extinct, and that was a sanctuary for them. We spent quite a little time. But we did not have time to go through the hot pepper area where they make the Tabasco sauce. We have since used quite a little bit of Tabasco sauce, and, believe me, it is hot stuff!

We went from there on into Florida. We had a little car which did not make too much speed, but I held it up to sixtyfive, and I got called by a cop at one time because I was exceeding the speed limit by five miles an hour. But he said he was going to watch me, but he didn't arrest me at the time.

We made Jacksonville, where I made up a Rotary meeting, and we thought we would have quite a little fun in on our trip, so we took silver dollars with us. And I had bought several things on the way with silver dollars, and I always noticed the clerks, how excited they would become, and they would dig up paper money out of their own pockets and replace it so they could have the silver. That

happened many times. However, when I made up my Rotary in Jacksonville, I presented them with a silver dollar, but they came right back and presented me with one which was made in Carson City at an earlier date than mine!

We went from there up through South Carolina, thinking that if we took the coast route, we would be able to see the Atlantic Ocean. However, the coast route is hidden from the Atlantic Ocean by about two miles of timber, and there was only one beach where we did get out and look it over.

Then we went on into Wilmington, North Carolina, where [a] battleship was stationed as a relic, and where Elaine Moore, the other little girl who had taught in Carson, lived. We spent some time with Elaine and her family and drove on through the Carolinas 'til we came to the mountains. And we examined quite a few resorts on the way over, and went on 'til we came to a town in Kansas, where my sister lived, and we spent a few days with her, and left that, and went on through Colorado, my old town at Gunnison, Colorado, saw a few people, kept on going until we reached Nevada, and had been gone about a month.

While I was gone on this trip, that happened, I believe, in 1962 or '63, some changes had been made, and some of the boys in the laboratory, one in particular, was moved down to Las Vegas because Bob Arkell, who had been in charge of that lab, had come up to Carson and became a member of our materials survey crew, so we sent Jim Pomeroy down to Las Vegas. And I believe that was in 1963.

And in the new building, they put James Sullivan, my chief assistant, and Norman Noteware, who were in charge of special office projects, and we put Paul Reuben in charge of the soils, that is, common tests for soils, and routine tests on aggregates, put him in charge

of that laboratory with several helpers. And Don Collins, who had come to us from the state of Oregon, after a special examination of several, was put in charge of the special soils and aggregates lab where the strength tests were made, and he was, of course, allowed to secure the apparatus with our consent, that he needed. And Robert Whittemore, a former teacher who had come to our laboratory several years before, placed in charge of the asphalt lab, was moved to the asphalt lab at this time. However, Robert, unfortunately became very ill several years later, and passed away. Then Jim Hodge was placed in charge of the stabilometer laboratory, which had quite a little machinery, compactors and stabilometers, and a room where sieve analyses and tests could be made. And Hal Kispert, who had been an employee for some time (and, by the way, who was a former assemblyman from Churchill County), was again placed in the cement and concrete lab, where we tested steel in concrete, and steel. And Budd Rude, of course, was placed in the new chemical laboratory. Robert Widaman, an ex-mining man, was placed in charge of drawings and charts relating to gravel deposits for the special provisions, and he was housed in one of the little offices near the main office. And Marie Russell continued as head of the girls in the office, and so forth. At that time, we had, I believe, four in the office and one or two others working out in the laboratory, taking notes and doing stenographical or typing work.

Materials survey was placed in the hands of Milton Ross. Ed Marriage had been in charge, but Marriage was transferred to District Four as district engineer at Ely. Ross had had much experience in this work, anyway, so he, for the time being, was placed in charge of the materials survey work—that is, where we'd go out and prospect certain

areas for suitable gravel and other aggregate deposits. It was necessary, of course, to take what we called record samples, and that has been explained to some extent already, where the Bureau of Public Roads required record samples of construction, and we found it best to send the man out, if we could possibly do it in time, and get samples of each individual layer before another layer was on top. If we waited 'til all the layers were in place, very often, there was an exchange of aggregate sizes at the interfaces. So to avoid that, we had these boys, when they could, take the samples before another layer of material was put on.

Usually, where we had to use quite a lot of base, we put Type-One base, which was a large, maximum-size—usually up to about two and a half inches. We put that on the bottom. And it was watered and rolled, and over the top of that was put Type-[Two] base, which usually was one-inch maximum size, more often three quarters the maximum size. But sometimes, at the interface, there was an exchange of materials, and it was sometimes hard to differentiate, or to find the exact place where one began and the other left off.

Then, as a rule, before the asphalt surface was put on, and most of ours were asphalt in the state of Nevada, we put on what was called a prime coat, three quarters of a gallon of a lighter oil. This would penetrate into the Type-Two base a certain distance, so that when the core was taken of the hard blacktop surface, some of this prime always had to be removed because it did not belong with the surface that was really a part of the Type-One base. Now, we had started out with Richard Biggs and G. L. "Buck" Eldridge in the northern Nevada area. And Jim Pomeroy, down at Las Vegas, and helpers secured those kind of samples in the Las Vegas area. We were so removed in Carson City from Las Vegas that it was much better to have a lab

down there and take some of these special samples, which provided them with means of testing them. In the summer of 1964, we had fifty-seven people in the laboratory, that is in the old lab up at the main Highway building. But after moving in September, the student help had gone back to school, leaving us with about forty-two or -three regular employees. That's counting the people out in the field that did the materials survey work. During the year 1963, it was also necessary, at the request of the state personnel people, to describe classifications of the different jobs, and qualification standards for chief and assistant chief materials and testing engineer. Now, copies for the chief testing engineer are attached and explain pretty much in detail the duties and qualifications. These can be reviewed by future researchers. I am not explaining them in detail at the present time; it would take too long.

In the laboratory in 1962 and early 1963, George Allison, who was working with Bob Whittemore in the oil. lab, prepared a paper after considerable research. It was entitled "Liquid Asphalt Viscosity Changes Due to Contamination." Sometimes in shipping the oil, the cars would not be thoroughly cleaned out. It might have had the light grade in; then they put in a hard grade, and, of course, the hard grade would be changed by contamination. And George did quite a little study on the amount of contaminant necessary to put the specifications for the harder asphalt, for example, out of sight of the specification limits. And if I remember correctly, this paper was presented by George at a meeting of asphalt men and testing engineers in San Francisco in the spring of 1963, and I accompanied him on this trip. Both Robert Whittemore and George Allison had worked on this report during the fall and winter of 1962 and '63. And I am turning

the paper in at this time as a section in this autobiography.

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The Nevada state Highway Department is called on very often to help out in emergencies of one kind or another, particularly in emergencies having to do with things that happened along highways, such as accidents, auto wrecks, blockades by snowstorms or floods. The maintenance people throughout the state in the five or six divisions do a lot of this work, while the police department, of course, the local police, take care of most of the accidents, of course, and report them. But the Highway maintenance crews are very often called upon to help. However, once in a great while, the headquarters crew in Carson City is called upon in case of emergencies. I should like to mention two occasions in which the people in the headquarters took part in emergencies. I had a small part in each of these, also.

One occurred in the wintertime (probably it was in the late thirties), in the years before the Clear Creek grade was opened in the winter. At that time, although the road had been built, it was closed after the heavy snows came. There was no attempt to keep it open. People who lived at the Lake in those days were up there in the summer, then closed their houses down for the winter. The businesses and clubs had not yet begun to take hold.

In this particular case, there was a young couple from Missouri. Maybe the saying, "If you're from Missouri you have to be shown," would apply there. But there was a sign at the bottom of the grade, stating that the road was closed. Apparently, they disregarded that and started with their two or three-year-old daughter (I believe about two-year-old) on up the grade. When they got up there about

six miles, they got stuck in a snowdrift and could not get back or forward. I believe they stayed there one day and one night. Nothing happened (no one was traveling the roads, of course), so the young man decided he would try to go back and get help. He had a small caliber rifle (I believe it was a .22), and he started out. The food that they had was practically nil. I believe all they had there was a package of dry oatmeal and a can of mustard. In any event, he had started out to get help. But according to the young wife, when she was found (of course, he hadn't appeared), she and the baby managed to get by and keep alive on that meager fare for a period of six or seven days. And it just so happened, fortunately, that a couple of caretakers in the Glenbrook region had made their way to Carson City on snowshoes. They found the car in the drift, and while they could not do anything about it themselves, they noted the conditions, and when they got to Carson City, they immediately notified the state Highway Department. Bob Allen was state Highway engineer at the time, and he called a number of the Highway Department employees into a meeting. He said there was an emergency; we would organize a group to get up there and see if we couldn't rescue that young woman and the baby. This was done. We got together a toboggan and warm blankets, clothing, and a little food. Quite a number of us drove our cars up the grade as far as we could go. But the actual toboggan crew was composed of about four people. I don't remember now just who they were. We got up there by late afternoon, and the boys with the toboggan made their way on up to the place where the car was and loaded the young woman and her baby daughter onto the toboggan and came back down and brought her into Carson. No one knew what happened to her husband. He had never appeared in Carson City. This

girl was taken care of by donations from the Highway Department temporarily. In the meantime, a searching party found the body of the husband. He had gotten down the Clear Creek grade probably within about half a mile of the poor farm. Had he gone another few hundred feet, he could have seen the dwelling. Apparently, he had become despondent and discouraged, and he'd taken his own life. He had shot himself through the head. This was rather a sad occasion. The department felt very sorry for this young girl. They took care of her and the baby for a while, then finally put her to work, gave her a job in the Highway Department. She worked there for a period of time, doing whatever she could do, such as possibly filing or some clerical work. And to the best of my knowledge, she soon got married and left the department, and that's the last I heard and the last I know about this particular episode. One other event that is certainly worth mentioning—. One late spring, I believe either in late May or in early June, some young fellows had gone down to the Carson River; in fact, they had gone on up to what we called the Mexican Dam, and had gone into the water. Very shortly thereafter, one of these young men apparently got cramps, something happened, and he disappeared from sight. The water at that time was very, very high in the river. And the news got around, and again, the Highway Department was called upon to do what they could with the situation.

Bob Allen called us together, and I believe he appointed George Egan the head of the crew, and several other of the department heads acted with George. Then others of us were separated into small units, and each unit was given a section of the Carson River to thoroughly search. There were units on either side of the river. The unit I was in consisted of Everett Harris, Frank Berger, and me, and

right directly across the river from us, there was a unit consisting of Edgar Norton and Kink Melarky. However, our particular area was to begin about four miles below the Brunswick bridge and from there to about two or three miles from Dayton, which meant we had to traverse the entire distance from the Brunswick Canyon bridge to Dayton, Melarky and Norton on one side of the stream, and the three of us on the other.

The water was extremely high, and riley, dirty, and had the body been in the river, it would've been very difficult to find it. We did search, and we prodded wherever we thought we could when we reached our particular area. However, on the southeasterly side of the river, there [is] a portion of the Pine Nut Range, in which steep banks come down in contact with the river, and it's not possible to get by those steep banks in high water. I think there were eight or nine of those between the Brunswick Canyon bridge and Dayton. And we had to climb up over the hill in each case to get from the upper part of the cliff, or mountain, to the lower part; in the meantime, prod around the best we could for the [body].

Everett Harris had the "foresight," he said to bring a little elixir along, and he called this *spiritus fermenti*. It consisted of a pint of some kind of bourbon (I don't remember the exact kind). Whenever we came to one of these places where we had to climb up over the mountain, we would look it over quite carefully, and Everett says, "Well boys, before we tackle this one, we all must have just one little shot of our *spiritus fermenti*." Whether or not it actually helped us, I don't know, but I think when we hit the eighth or ninth, we welcomed it very much. By that time, *spiritus fermenti* was about exhausted.

(Everett Harris was quite a character. He was noted for some of his ideas, and he

seemed to dote on playing jokes on people. About that time, one of the prison wardens decided to stock the ponds and mud holes around the prison with Louisiana bullfrogs. Those bullfrogs, of course, are very good eating, as frogs go, but they have terrific voices. The name "bullfrog" is an appropriate name for them. Everett caught several of those and took them over to Reno on the q.t., and slipped them into his sister-in-law's lily pond [laughing].)

One rather interesting thing happened. While we were hunting the body, across from us were Norton and Melarky, and they were shouting something to us. We went back exactly opposite where they were, where the water didn't make so much noise that we could hear them, and they told us that they had seen a rattlesnake about six feet off the ground up in the willows, climbing through the willows. Presumably, he was looking for birds' eggs or birds' nests. That was the first time I'd heard of a rattlesnake climbing through willows that high. Needless to say, none of us were successful in finding the body of this young man. I believe Norton and Melarky were picked up a good many miles above Dayton from a road which came in from the northerly side, opposite Moundhouse. We had no such roads. We had to walk the entire distance. And we were three tired people when we got to Dayton, and there we met our leaders and bosses, who were waiting for us in Dayton. This experience was one which I'll never forget. While we could not find the body, I think it was probably because the water was so cold, it was not possible for the body to surface. However, several days after, perhaps a couple of weeks, the body did surface and was found at a distance of only a couple or three hundred feet below the point where he'd gone under water.

I believe at this time I shall mention some things about mining. For many years, I had been interested in minerals and mining, and the prospect of finding gold or some other valuable mineral was always present with me and with many of my friends. When I first came to Carson before I was married, I got acquainted with a man by the name of Alex Eske. Alex was a typical prospector and a typical optimist, but he was always broke. He and his wife lived in a house in the eastern part of Carson City, and he was very kind to me, nevertheless, and took me up to his prospects in the upper Brunswick Canyon area. One he called the Gold Coin mine, and the other the Edison-Eske mine. Both had showings of gold, and Alex Eske enjoyed digging in along the walls and getting gold and panning it for people who came up to see it. He made a good many attempts to sell, but he kept his price so hoisted that he never could make a deal. I think whenever he had an offer, he usually raised it up so that he spoiled his own business.

He had a cabin up there and a camp. And he always left the door open. There was always food there for prospectors and others who came through. He was not very well thought of in Carson City because of quite a few things. Although he was a great optimist, I think sometimes he stretched stories quite a bit, especially when he got up to a bar with his prospecting friends. Anyway, he did show me quite a few things about formations, and I learned quite a little from him, and was interested in getting some kind of claims for myself. My friend, Don Olmstead, who took my place in Carson High School after I left, also got interested in prospecting, and we, several times, had gone out together. However, Don Olmstead and I never found anything particularly valuable. We saw some interesting sights. In those days, there were

quite a few wild horses up in the Brunswick Canyon area, and every once in a while we would see a bunch of these horses. And at one time, we saw a mountain lion. But he was probably more wild than were the horses. He got out of our sight very shortly. Having this interest in mining stuck with me, probably much to the discomfort, sometimes, of my wife because I would spend more time doing that on weekends than I should. However, Clarence Meginness and P. L. Woodgate, both working in the laboratory, one time had made a little excursion in the mountains west of Carson City, and had gone up to what was called the old Athens mine. The old Athens mine was not much more than a prospect which had been gophered in the gold-bearing material, and a small two-stamp mill had been built way back in the seventies or eighties at the foot of the mountain below the falls, up Kings Canyon. That mill stood there for some years, and I think was finally destroyed by fire. I don't remember the names of the old-timers who mined there, but the stories were that they had found some very rich gold. Meginness sampled a small quartz seam in one of the mouths of one of the old tunnels which had caved in, and the assay showed two hundred dollars per ton in gold. So we immediately contacted the Mullers, who owned the property (it was the only patented claim, I believe, in Ormsby County), and made an arrangement to lease the property, which we did, with the understanding that we would pay a ten percent royalty on anything we got out of the mine. This was principally a weekend proposition. When we first went up there, we had to walk most of the way because my car would not pull the heavy grades. Meginness, through contact with some Indian fellows, found out that there was an old-time 1923 Dodge for sale in the Woodfords area. It had belonged to another

Indian. We went up there one day and looked it over and bought the thing for forty-five dollars. The old-time Dodges had a powerful low gear. Although the gearshifts were just the opposite from the modern cars, the gear was extremely powerful. And this particular 1923 Dodge had heavy duty springs put on it. It was a touring car. The top had been taken down, left the windshield only, and a little box placed in the back, making it a small-size pickup. The tires were not good. We bought the thing and bought some tires, and that was our transportation up and down that very steep road. About the first thing we had to do was remove some huge boulders up near the mine itself. We could not drive right to the mine at that time. This we did in the usual manner, which is placing the powder on top of the rock, several sticks of dynamite at a time, then cover it with a bed of mud. Dynamite has a tendency upon exploding to.. .the greater part of the force is said to work downward. We cracked our boulders that way and were able to bar them off the road so we finally got up right to the mine. Our initial work consisted mainly of cleaning out this old working of that vein of rich ore and putting in stulls and a little lagging. The formation was in a schist. And unfortunately, the veins, instead of being vertical, were flat, so that an immense amount of waste material had to be removed in order to get at the ore-bearing material. And this one little seam was the richest we'd found. However, as we had made a little progress into the mine, we found that the gold would leave that seam and be in another seam above or below. You could not always see the free gold in it, although it was free gold. We had to do a lot of panning. We had a mortar and pestle and did a lot of panning in order to find out whether we were actually taking ore or not.

I remember Percy Woodgate and I argued quite a bit about what we were putting in the

sacks. If we put too much rock in, I knew that we would lower the values, and I had a hard time convincing Percy that we should get rid of all the waste we possibly could. We managed to do so, and I believe this first summer which we worked that must've been around 1936, or thereabouts. I believe we got out about four tons of ore in sacks, and we took it up to the Trimble mill at Silver City, and it milled out at about sixty dollars per ton net, there being about a ten percent loss, perhaps a little more than that. The tailings, then, went on down to the mill, where there was a cyanide plant, and they were run on through there, and we gained a little bit more from those tailings. I've forgotten now what the mill charges were, but I believe we netted about fifty-five dollars a ton, or something like that, from the ore we hauled down. This was not a money-making proposition, but it did give us kind of a thrill to get some money out of it.

Another thing which was of value to us was the firewood available all around the area. In the first fire, in July of 1926 (there were two big fires that year, the biggest one was later in the fall), but in that first fire, the area burned was above the springs and on up toward the Athens mine so that there was quite a lot of burned and dead trees there, and I think we spent about as much time sawing those trees up and bringing them back on the old truck as we did in the mine. It was difficult to get the truck up that hill. There were some twenty or twenty-five percent grades. However, to make it easier, we usually loaded rocks on this ballast to keep those tires in place. The brakes were not good, but coming down the hill, we put it in low gear, and that very low gear was good on that account. I think we had more of a picnic than we did a real mining expedition. We took many of our friends up, and took our families up on occasion, and we

made quite a party of the thing. Meginness quit after the first year, and Woodgate and I decided to continue the following year. However, we did not have time to do any real mining. I had written to Mr. Fairley, Ruth's father, and at that time, the Depression was on in Grand Junction, and he had no longer a job with the fruit company, and he decided to come on out, and for five dollars a day, he would help in the mine. We also got George Baxter, a local boy, to work for five dollars a day, and there was another man who would work part of the time. Mr. Fairley was an expert miner. He had been a miner in the lead mines around Joplin, Missouri, and his father was a miner before him, and the two of them had mined in the Colorado country. Mr. Fairley did much of his mining in the Cripple Creek country and became one of the mill and mine foremen in that area. I believe he was foreman on the old Gold Coin mine, for one. Anyway, with this background, he was a good man to have up there. So they worked about the same fashion we did, that is, Mr. Fairley and his crew, but the veins were small, and as, I said, they were in there flatwise, and it was very difficult to get the ore out with high values. They did manage, though, to do about like we did, and managed to get sixty-dollar ore in the shipments to the Trimble mill. We made enough shipments in doing that work so that the total we received from that, without taking out our expenses, was something like six hundred dollars. However, when the values began to play out, Mr. Fairley said that it would not pay us to continue. He said, "We might find some ore, but it might cost you a thousand dollars to find any more of the ore." The deposit in this schist was a secondary enrichment. Apparently, someplace up there, there must be a good deposit of gold which was feeding the secondary veins. Woodgate and I talked it over. He was in favor of

continuing, but I didn't see where I had the money to continue, and actually, he did not either. So we dropped the project, and Mr. Fairley went back home. After that time, however, I believe Woodgate continued the lease, and he and Mel, his boy, worked the mine to some extent, but I don't think they ever gained anything from it. Finally, they dropped it, and George Meyers of George Meyers's hardware store, got interested and spent quite some time up there, and I believe he finally purchased the old Athens mine, but I don't believe he ever produced a pound of ore out of it. It was a pretty good place to go up there on certain days, maybe, and hide out and do a little prospecting. In any event, George now owns it, and he contacted me just the other day [laughing] (I'm talking now about March of 1971), and asked if I had any specimens from the Athens mine, and if I did, he would buy them. I told him I did have some specimens. They were not the best (we put some of the best ones into the last milling), but he was welcome to what specimens I had. He had been given some very fine specimens from some lady in town who was related to some of the early workers. I don't remember their names. And he was making a cabinet for it. So I gave him what specimens I had from the Athens mine. That took care of my mining experience for a short time. There were other experiences which I shall describe later, namely an experience with tungsten, and another with perlite, nonmetallic. I must mention some of the events which took place in my immediate family and with relatives during the next few years. It seems the middle years of our lives, say, when we're in our thirties and forties, are the busiest times. I recall that I personally was involved in quite a few things in addition to my regular highway work. I've already described the more or less mining operations, and the National Guard.

I also joined the Masonic Lodge in 1938, also joined the Rotary Club in 1938. Mrs. Little was active in Eastern Star. She was a Matron of the Eastern Star in Carson in 1940, and she was also active with young people. She had what were called the Girl Reserves in the early thirties, and shortly after that, the Rainbow Girls were organized. Mrs. Donald Olmstead, Dorothy Olmstead, was the first Mother Advisor for the Rainbow Girls, and Ruth was the second advisor, a position she held for a couple of years. Our daughters later became Rainbow Girls, but they were not old enough at the time Mrs. Little was Mother Advisor.

Then during the war, when the women at Stewart could make two or three times as much as riveters, teachers and many others just left there, and they were crying for a substitute teacher. So Mrs. Little taught out at the Stewart Indian School for several years on a day-by-day basis as a substitute. Of course, my sister was working out there at the same time, too. All of these things were going on during the wartime, after the Highway Department had cut down on its boom in construction, which had taken place in the late thirties.

Because of the growth of our family, the little cottage at 704 Phillips became too small, and we looked around for a place to buy. At that time, Mr. and Mrs. Arnold Millard, who lived in the Stenz house (Mrs. Millard, by the way, was a Stenz girl) at 102 Phillips (I believe that was the number), had decided they should sell. We looked the house over and liked it, and agreed to a price of \$4,500. Some little problem was there, in trying to raise enough money for a down payment, but we did so by borrowing on our cottage, and made the down payment; then we paid the rest out by the month.

This was quite a nice house. It has good size, it had the room we needed. It had a

full basement; one-half was a fuel room, the other half was a place where laundry could be done, and there was room for bedding. This basement, also, could, upon occasion, be converted into a bedroom, or even a dormitory, which was done when the occasion arrived. There were four rooms on the first floor— a fairly good-sized combination living room and dining room, which really were two rooms; an entrance way; and a kitchen with what might be called a butler's pantry in between the kitchen and the dining room. Then upstairs, there were three nice bedrooms, large ones, and a bath. And above that, again, was a full attic, which later turned out to be quite a playhouse for the children and their friends.

In order to make ends meet, we rented out the cottage, and for the next several years, it was rented to the following people: first, to Paul and Mildred Osgood. Paul had charge of the Standard Oil distribution in the Carson City area. And they left, and it was then rented out to Gene and Bessie Robens and their little girl. Gene Robens had become an employee of the laboratory, and I have mentioned his name in connection with the National Guard, and he had also done some office work in the lab. But during his last year or so of service, he was doing testing out in the laboratory, itself. Then when Gene's wife, for some reason, had to leave (I think On account of illness in the family, or for some reason), she had to go back to her folks near [the] Salt Lake area, and Gene, then, stayed at our house, in the big house, and had board and room with us. And then at that time, we rented it to John and Ruth Flournoy. Flournoy was a laboratory employee for a while, and then went into the planning department with Billy Holcomb, went into the service and finally came back into the Highway Department, and is at the present time acting chief right-of-way agent. This is 1971.

In the meantime, shortly after we had moved into the Millard house, Mr. and Mrs. Fairley had left Grand Junction and had gone to Oakland to live with their daughter, Moss, and husband, Victor Wagner. Victor was an attorney there. And Mr. Fairley was given some kind of a job (I've forgotten what it was) in an office, but that particular job did not agree to him. So one day, here they came, and decided they would much rather live with us. Of course, we had the room in the house. Mr. Fairley, however, was not employed. The Depression, as I have said, cut out the fruit business in Grand Junction—in fact, that was part of the reason. The other reason was that the English people had refused to take the fruit (heavy shipments had been made to England) on account of the fact that a number of Englishmen had been poisoned, and it was said, that poison had come from arsenical sprays on the fruit. After that time, then, the fruit all had to be washed in hydrochloric acid and rinsed off and dried before it was shipped, and the cost was such that it no longer paid to do this. And one of the principal markets was cut off. And during the Depression, things got worse, and Mr. Fairley finally was out of a job with the Fruitgrowers' Association. Of course, this happened earlier, and he came out here to help with the mining. But then he had gone back to try to settle their property, which he did. They got some small payment for their property, and I think got small payments every so often.

Soon Mr. Fairley became interested in trying to start a nursery business. He first started down at the Noteware place. Norman Noteware was back, and he had this huge garden area that was not in use, and Norman very kindly let us start some shrubs and other things there, and Mr. Fairley got a start in the nursery business there. In the meantime, there was an opening in the schools for

janitor service, and he got into that for a while. However, his principal interest was in the nursery business. And while he could not do as much as he wanted to at Noteware's, he did get a start. Those people who go by the Noteware place will see some rather huge pine nut trees and some Jeffrey pines growing there. Those Jeffrey pines came from the Lake as small trees and were put out there in nursery rows at the time. The pine nut trees that are there I grew from pine nut seeds which I planted in 1934. And those little seedlings were taken from the cottage down to the Noteware place, and there're four or five of those trees left from those 1934 seedlings.

Later on, when our cottage was free, and the Flournoys left, we decided to move Mr. and Mrs. Fairley up there. I must say a word about Mrs. Fairley here. She was an excellent seamstress. Before she had met Oscar Fairley, her husband, in Cripple Creek, she had been doing professional sewing for many of the Cripple Creek women, and some of her work was really wonderful. She had made garments for Ruth and for the children, and she had done some wonderful—I don't know what the words are, whether knitting, tatting, crocheting, or something of the kind—did some very fine art objects, in fact, and useful objects, which she had made. However, she and Mr. Fairley had the upstairs bedroom in the big house, and she seldom came down. It was warmer up there, and Ruth got the idea that if she could be taking a more active part, she would be doing more. So they moved up to the little cabin, and at the time, I believe Mr. Fairley was seventyfour and Mrs. Fairley, seventy-two.

I had had the soil in very good shape from the time I lived there. Of course, our renters did not take very good care of it. But Mr. Fairley soon got the soil in very good shape, and about that time, the Dayton Dredging

Company quit the dredging operation at Dayton. They had a huge walking dredge lifting that material that came from aggregates, and gravels came down from the wash from the Silver City country, and it was lifted over onto a floating boat or barge, where the gravel was screened out, and the gold was caught on the mercury-treated plates, like in any mill. This operation apparently got so it did not pay off, so it was abandoned, and Percy Crocker, who was acting as superintendent, sold all the spare parts. He sold to Mr. Fairley all the glass that came off the boat, and Mr. Fairley hired Sture Svensen, a local carpenter, to construct a greenhouse using that glass. He did this at a very low cost. So he then had a greenhouse which was invaluable to him in starting his plants. He also built a garage for his car. I had never had a garage on the place.

Mr. Fairley specialized in this nursery in small perennial plants and in pansies, but he sold trees and shrubs, also. He called the nursery the Carson City Nursery. That was its official name, and it was the only nursery in Carson City for a number of years. I recall one year, he sold four thousand dozen pansies wholesale to Mr. [Clyde] Cannan in Reno. Mr. Cannan, in addition to running the drugstore, he used to sell plants. Mr. Fairley grew all of those plants himself, and boxed them, and shipped them by truck over to Reno. I helped him whenever I had time, doing quite a few things in the nursery. He also specialized in fancy perennial plants such as fancy delphiniums, columbines, and primulas. There was more money in those kind of things than there was in retailing shrubbery and trees which he had bought wholesale.

There was always some kind of trouble with the small plants. The worst trouble was that quail just loved those tiny pansies when they were coming up. So Mr. Fairley conceived of an ideal of taking care of the quail. He

would put wheat down on the ground, and had a series of lath made into great sections. He had a string tied to a stick holding the lath up. When the quail got down under there, he pulled the string, and the quail were all under the lath, and that way, he could catch them. It's against the law, no doubt, to do much about those quail, but he did something about them. He simply had to do that, or he couldn't've raised his pansies. When the pansies got large, of course, the quail didn't like them so well. Mr. Fairley continued his work as janitor at the school the first year he was at the little house. However, he discontinued that as the work got heavier and his business got better. I gave him as much help as I could when I had the time. It seems that the mid-thirties and late forties were extremely busy times for both of us, raising a family, and doing this and that. And Ruth started in teaching at the Indian school as a substitute teacher, I believe in '42. I have mentioned that she was interested in Rainbow and Eastern Star, but she also had been president of the Ladies' Aid Society. We both did considerable work in the Federated Church. I was on the board for a number of years. Finally, when they disbanded and the churches went each their own way—we stayed with the Presbyterian church for a while, but when it got to the point that the congregation fired preachers faster than they could be hired, I thought that, as far as I was concerned, that was not religion, and I decided if I wanted to go to church, I would go somewhere else, if I went at all [laughing]. I did a lot of work on the grounds around the Presbyterian church. We also donated considerable toward the building of the new Sunday school. At the present time, we do not attend.

Before I leave the discussion of the Fairleys, I might state that Oscar Fairley was a master Mason, Mrs. Fairley was an Eastern Star, and they had been respectively past

patrons and matrons of the chapter in Grand Junction, Colorado.

I think I shall now discuss the formation and the early years of the Carson Rotary Club. Reverend John Harvey, of course, was a Presbyterian. He was pastor of the Federated Church for many years, and he had a very fine family. I believe there were in the family three boys and two girls. John was interested in many of the happenings in Carson City. He and his wife were very fine citizens. He took great interest in community affairs, and he was well acquainted with many of the Minden people. In particular, he was acquainted with Hans Jepsen, who, I believe, was county clerk at Minden. In 1937-38, Hans was the president of the Minden Rotary Club. They had been organized some years before. There was not a Rotary Club in Carson. So Hans and John Harvey got together, and that was the beginning, at least, of the Carson Rotary Club. John got busy on the phone and called a number of Carsonites. [It] ended up that twenty-five of them were interested enough to join the Rotary Club and become charter members. The Minden club would then be our sponsor, and it was assumed, and actually did happen, that John L. Harvey became our first president.

We held several meetings at the old Arlington Hotel before we were officially a Rotary Club. And I recall at one of those unofficial meetings the idea of Admission Day occurred. It occurred in the fertile brain of Tom [laughing] Wilson. That was the first indication of renewal of the old Admission Day celebration. Tom did not get credit for that in particular. It was thought that someone else was the initiator, but the initial thought in the Carson City Rotary Club—in, as I said, the fertile brain of Tommy Wilson. Others, then, were told of this, and later on, as I shall explain, arrangements were fully made to celebrate Admission Day in the fall of 1938.

In the meantime, I think I shall explain what happened on Charter Night, the night that Carson City officially became a Rotary Club and a member of District Number 105, which covered, at that time, Nevada and northern California, I believe. Officiating at Charter Night were Alison Ware, district governor of District 105; and Hans Jepsen, special representative, representing, of course, the Minden Club; and John L. Harvey, as president; Raby J. Newton as secretary-treasurer; and Peter A. Amodei as sergeant at arms. The directors were the following: John L. Harvey, William T. Holcomb, T. L. Duncan, Bernard C. Hartung, Hugh A. Shamberger, George A. Martin, and Charles B. Austin. The twenty-five charter members were (and I will repeat some of these names, of course): Peter Amodei, Charles Austin, Otto Benham, Denver Dickerson (who at the time was a publisher of one of the Carson papers), Elmer [H.] Douglas, T. L. Duncan, Leslie [W.] Edwards, Bernard Hartung, John Harvey, Arthur Holgate (whom we called "Eck" Holgate), William T. Holcomb, Robert B. Jeppson, Edward L. Krenzer, Jud[son] D. Lamb, Lawrence Little, George Lind, George Martin, Raby Newton, John [L.] Savage, Ernest [C.] Sloan, Hugh Shamberger, Joseph [T.] Snyder, Shirley [W.] Sparks, Joseph T. Vest, and Thomas C. Wilson. Another person whom I must mention, and who was of great service to us in the Rotary Club, not only at the Charter Night, but for many years thereafter, was Mrs. Krenzer, Alberta Krenzer. She served as our pianist.

Our first number of years in the Rotary, we emphasized the music, and there were always a series of songs we sang, such as, "R-O-T- Means Rotary," and so forth, and many of the old-time songs, and it added a lot to the fellowship. And [in] late years, Rotary has not been able to get into a place large

enough to hold the club, and hold the piano, and get a musician. And what little music is had is done a cappella, after a fashion.

I will not go into all of the details of this Charter Night. We had much help, of course, from the Minden people, and there were representatives from other nearby clubs. Tate Williams, for example, sang a solo. Tate was secretary of the Reno club. And we had a welcome by Fred Dangberg of the Minden club. And we were served a very fine meal. Honorary guests were Richard Kirman, governor of Nevada; W. H. Austin, president of the Carson City Lions Club; and Lawrence Johnson, president of the Carson City 20-30 Club.

During the first few years of Rotary, many community activities were sponsored and helped in by Rotary. A lot was done by many of the members who were too old, or for some reason or other, could not get into the service during wartime. However, one of the first participations of Rotary, in a rather large way, was in the first Admission Day celebration. Many of the Rotarians took prominent parts in that, and I'm going to describe rather briefly some of the organization which took place in order to put on this first Admission Day.

As best I can recall, the general committee was composed of Judge Clark Guild as chairman, who worked faithfully on this, and he was assisted by R. A. Allen, state Highway engineer, Ira Winters, Kerwin Foley, and Lawrence Little was on this committee. We had much help from other people. Fred Grubic, who was publicity man for the Highway Department, and Beverly Thomas were [also on this committee]. I'd forgotten just what Beverly's function was on the committee, but she did help somewhere. Fred Grubic was publicity man and took care of the coverage—part of the coverage, at least, for the press. Mrs. Carl Gottschalk; Ella Gottschalk,

of Reno had written up an historical pageant, and this historical pageantry was one of the main themes of this first Admission Day. The pageant was to be held on the capitol grounds, where these different historical groups would perform and march through in the presence of an audience, which would be seated in chairs on the ground. There would also be a parade, and this was the first parade. I don't recall just how large a parade it was, but not as large as they were in later years.

My particular area was arranging for traffic, and arranging the grounds at the capitol for the pageant. That meant getting chairs from many, many places, sufficient to seat about four to five hundred people, or at least as many as we could get in the capitol grounds. This was done by getting the chairs from different organizations in Carson City, and a good many of them were hauled over from Reno. Kerwin Foley, Joe Farnsworth, Harry Anderson, Ira Winters, and a lot of these other people did very much of this groundwork.

The WPA in those days was under the guidance of Mr. [Gilbert] Ross (I've forgotten his first name) of Reno, and he had a very efficient helper, or, helpers, rather, Vera Sale and Jack Cooney, and a fellow by the name of Piggott. Jack was more or less director of the pageant part of it; Mrs. Sale was the general overseer, and Piggott, I believe, handled the music part of it.

Ira Winters took care, as I recall, of the parade and the horses in the show, and Kerwin Foley was helping in all fields. I owe a lot of thanks personally to Dee Adams, who helped me get the tules to build the Indian wickiups on the capitol grounds. There was a lady in charge of the Carson Indian school at the time, who replaced Mr. Snider, by the name of Miss [Allida] Bowler. Miss Bowler's name did not get on the general committee roster;

therefore, she was somewhat disappointed and decided that she would not let the Indians participate in getting things ready. Therefore, instead of the Indians getting the tules to build the wickiups, Dee Adams and I did it. I took two weeks of my own time, took my annual leave, and much of one week was taken up in cutting those tules down by the Carson River. In spite of Miss Bowler, the Indians did perform beautifully in the pageant. They did some very marvelous dances, and they participated in the parade. They also did, finally, build the wickiups along the capitol.

There are pictures available of this parade. I have some of them stashed away somewhere (I hope I can find them), and I know that Jack Cooney, with whom I was just talking about this on the phone a few minutes ago, also has some stashed away. Between us, we shall try to recover some of these pictures to be placed in the archives of the University.

There were parade participants from the surrounding communities, and, of course, a number from Carson City. One of the parade participants was the Carson City Band. And the Carson City Band was uniformed in the uniforms of an organization mentioned in the early Nevada history, called the Zouaves. These were very colorful costumes, presumably, that were worn by these Zouaves, and Mrs. John Chattin [Marjorie] spent many and many an hour putting together these costumes. The band members sort of made fun of them, but they wore them and participated in the parade, representing the historical Zouaves. I don't recall whether the Zouaves was a semi-military organization, or whether it was a band. I think it was a semi-military organization.

This first Admission Day celebration was the only one in which I participated on any general committee. I really was pretty well worked over in this one. After finishing

the day's work, a rainstorm came up, and before I could get those chairs moved back to the organizations who owned them, or at least get them under cover, the rain got them all wet. We did the best we could the following day to get them back to where they belonged, but I got quite a few ear jobs from the owners of these chairs. However, I am glad I did participate the way I did in this first Admission Day, in spite of the troubles. However, I decided thereafter that I would leave it to others. Although I participated practically in every Admission Day since, usually in the parade as a member of a band or playing in a concert as a member of the band, I did not try to get in on the general committee thereafter.

Going back briefly to Rotary, I might mention the first six presidents. I was among those; I was Number Six. The first, of course, was John Harvey; followed by Bill Holcomb; who, in turn, was followed by Alan Bible, our present U.S. Senator; who, in turn, was followed by Jack Ross, who was prominent as a U.S. District Judge, now deceased. And Jack Allen, next, who was a local druggist; and I followed in the years '42-43. There were many others following me since that time, but the only ones I can remember in order are those I've just stated, except that I believe Bud Austin followed me, and soon after that, Hugh Shamberger. But after that, I can't remember the order in which the presidents of Rotary occurred.

As soon as Rotary was organized, it immediately began to sponsor some community projects. One project which was badly needed was an athletic field for the newly built high school. Hugh Shamberger did an immense amount of work in getting this thing going. Rotarians and other clubs helped on it to some extent. But I would say Hugh Shamberger was the father of our first

high school athletic field, which, of course, is now in use by the grade school children as a playground. Hugh deserves a lot of credit for that particular thing.

Then, too (this was later, during wartime), many of us were on various committees, one of which was a committee composed of various service organizations and civil defense people, to prepare shelter and a temporary hospital. This was done by renovating the basement of the old U.S. Mint. And there were quite a few of us who spent a lot of time fixing up that area, cleaning it up and fixing it up, placing beds and bedding, and fixing up an emergency hospital. Rotary took a prominent part in this, as well as some of the others. At that time, I was also a member of Civilian Defense. I was second in command in the police; I was second in command to Harry Brooks. However, there was very little police work we had to do, but we held meetings nevertheless. Fortunately, the Japanese did not land on the Pacific Coast, and we did not have to get people over here from California.

Some of the things I have stated were not necessarily in conformity with time. I believe I had forgotten to state that several of us, right after the war had commenced—that is, several of us in the Highway Department, were selected to attend an FBI War Traffic School for Police. It was thought that the Japs might attack the country and come in through California, and we were trying to get prepared for handling the crowds and taking care of duties assigned to special police. After this was done, I've stated before that several of us were assigned different areas of the western part of Nevada to survey, with respect to housing and roads, and so forth, in case an influx of people would be forced in on us from California. I also was made by the local committee second in command of the wartime civilian police. Harry Brooks,

the sheriff, was top man in that respect. My sister was living in Carson City; in fact, she was working out at the Indian school during these wartime years. And early in 1941, my mother, who resided near Gunnison, Colorado, had taken quite ill, and her condition did not improve. We got an emergency call from Dad Little (I believe it was one day in early spring) that Mother was not expected to live very long. So Helen, my sister, and Ruth, my wife, and I got into Helen's car, and we drove practically nonstop from Carson City to Gunnison, Colorado over some pretty bad roads. We did stop long enough to get coffee and sandwiches, and we arrived in Gunnison just in time so that Mother did recognize my sister and me, I am sure. But shortly after that, she passed away, and we attended the funeral and returned home without staying over in Gunnison. I do remember one thing of consequence, as far as highway departments in the western states was concerned. And that was, on our trip out to Colorado, going through that portion of Utah in which the highway is really not constructed to any kind of good standards, approximately between Price and Cisco, Utah, we suddenly encountered these so-called salt boils. I came upon the first one so soon that I did not see it in time, and almost threw my sister through the top of the car. I will explain the salt boils later. There was a meeting in Salt Lake one time, where these were discussed at length.

For many years, I had been interested in joining a Masonic lodge, but it seemed, with raising a family and all the expenses that we had, that I could never afford to do it. Finally, I did join the Masonic lodge in Carson City in the early part of 1938. Carson Lodge happened to be the first one organized in the state, so it was known as Carson Lodge Number One. The three principal degrees in Masonry, I would say, are the first three that you get. It's called the "Blue Lodge." And

everyone going into the Blue Lodge must memorize, by word of mouth—they must learn by word of mouth, from another Mason, certain things, and be able to be examined on his proficiency in each particular degree before he goes on to the next. And you have a coach assigned to you.

My coach happened to be Francis Johnson, who was a student at the high school at the time I was teaching, and who is now employed by Muller's drugstore. Francis's job, in addition to being clerk, was to make deliveries, which he usually did on foot. And about the only time we could get together, so that he could give me what I had to learn, was in the evening. And in particular, when we were outside of the store, I would go along with Francis on his deliveries, and that was the way I learned what I had to learn in Masonry.

It was not very long after I had become a full-fledged Blue Lodge Mason that I was given a start through the chairs; that is, the chairs are the offices in the lodge. I started out as Junior Steward. At the time I went in, there were three of us who went in at the same time, Stanley Sundeen and Jack Johnson and I, all Highway employees. And some of our degrees were given by a Highway team, not the regular Masonic-elected lodge men, but by a team made up of Highway Department employees. That was interesting, of course. Jack Johnson went on ahead of me, but I went on through those chairs, and I skipped one chair. Of course, I did not get into the services, as I explained before; therefore, I was able to go right on through until I became Master. I skipped one of the three principal offices, the offices of Junior Warden, and went right into Senior Warden, and finally, I was made Master in 1943, I believe, and I was Master in all the year of 1944.

And at that time I thought, "Well, I will have it fairly easy because all the young fellows

are away at war. I won't have many applicants come in, so I will have an easy year of it." However, I was badly mistaken. It seemed that quite a few of the old-timers, who had always wanted to go in and perhaps didn't have the money, or for some reason or other— all of a sudden, here they came, and I was plenty busy putting on degrees all year.

It also happened, near the end of the year 1940, that I came down with pneumonia and was confined for about four full weeks. And thank the good Lord for old Dr. Thom. He, I believe, helped pull me through that ordeal. There was a long time I actually didn't get down with it. I was walking around with it for quite a little while, but probably too long. Penicillin had come into use, and it probably was not supposed to be used for civilians. But I did get some from Dr. Thom, and I suppose that helped me pull through. Of course, this same year, I was also president of the Rotary Club, and that responsibility also added to some of my trials and tribulations, all of which probably led to sort of a run-down condition which fostered the attack of pneumonia.

In addition to joining the Blue Lodge, I went on into the next part of Masonry immediately following, which was the Royal Arch. That consists of four degrees. And one thing I remember in particular, when I was taking my fourth degree (which is the first one in that particular section of Masonry), the average age of the degree team was seventy-six, as I can remember. And that team consisted of Ed Peterson, who was former state controller; Dad Hersey, who was minister of the Episcopalian church; Alex McCharles, who was county treasurer and who always took the part of Abraham Lincoln on Admission Day; Dr. [William H.] Cavell, I believe; and Dave Bartley.

Later on, a couple years, I went on in Masonry and took three more degrees, but

I never did go on and finish this particular section of Masonry entirely. I did not take the Knights Templar part.

I'm going to backtrack just a little. I could not think of the name. The York Rites include the Blue Lodge, and the Royal Arch, and all the rest, on through the Commandery. I thus stopped my traveling through the York Rites short of going into the section where you conclude with the Commandery. However, in later years (I think it was as late as, probably, about 1959 or '60), I did join the Scottish Rite, and went on through this Thirty-second Degree, and thereafter joined the Shrine. The part I have played with the Shrine for these several years has been a part in the band. I've played in the Shrine band for a good many Shrine performances and parades.

During the early 1930s (I've forgotten just what particular year), I became interested in the National Guard. The National Guard had been organized in Nevada, and as I recall there were two companies allowed by the government. One was known as the Fortieth Military Police Company, and the other, the Company D, I believe, of the 115th Engineers. Jay White, who was secretary to Governor Balzar, was appointed adjutant general, and officially, he received the title of brigadier general. In other words, he was a one-star general. It was necessary that a state detachment be organized, consisting of just a few men. I believe the tables of organization for that particular branch amounted to a group of no more than eight or nine men with two or three in commission grade. Several of my friends were in the Guard and had been in. My motive was not so much to serve my country in the National Guard, I suppose, as it was to bring in a few extra dollars to help support this family I had developed. So, Norman Brown, I believe, was next in command under Jay. I don't recall

at the time I went in whether Norman was a captain or a first lieutenant, but I believe he was a captain. And Ed Norton, another friend and pal of mine, was made second lieutenant. There was no more room for any more commissioned officers. The time I went in as a private must have been around 1932 or '3, and at that time, Wilson Russell, or "Swede," as we called him, had joined, and there was Fred Berning, Wayne Herberth, Francis Johnson (Francis worked at the Muller Drugstore; Berning was with the power company; Wayne Herberth was the local telephone head repairman), and there may have been one or two others.

The kinds of things we did there amounted mostly to paper shuffling. We sorted out Army regulations and various kinds of memoranda, filed things. We also did some close-order drill. We had uniforms. We were to keep those in good shape, and we wore them on the nights we had drill (I believe Wednesday night was the National Guard drill night). And we were supposed to attend the National Guard training camps each year. Those of us who worked for the state, and I believe those who were working for private concerns, were given the two weeks' leave without docking them from their Highway or other salaries, and without counting that as annual leave, which made this a fairly good thing. We had some good times, the few of us who worked at this. Jay White was an extremely interesting person, an excellent conversationalist. He was loaded with good jokes and stories. We all had a fairly good time, and we enjoyed the company. We also had some target practice with automatic revolvers, .45 Colts. All of us qualified in one way or another. I was one of the low men on the totem pole. I think about all I made was marksman. But there were some experts in the crowd, and some sharpshooters.

The pay didn't amount to much. It seems to me we got \$1.10 as a private, and about \$1.25 as a first class private. The corporal probably got \$1.40, a buck sergeant \$1.80, and I think a staff sergeant, the highest office to which I managed to attain [laughing], got \$2.20 for drill, or something like that. We got the same amount when we went to camp.

I did attend three different camps, summer camps. One was at Lake Tahoe, at the Boy Scout camp, near Zephyr Cove. It was held there because at the regular training grounds in San Luis Obispo there had been an epidemic of some kind (I think it was typhoid fever), so the meetings could not be held there that particular year. I managed to get by all right for the duties I had at this camp.

The next one I attended was probably about the middle or late thirties. I had the rank of sergeant; perhaps I was staff sergeant at the time. I got into two weeks of about the worst responsibility I had ever had. I'll describe this just briefly. The advanced detachment had gone down under Colonel John Grant of Reno (the advanced detachment, of course, had prepared the camp), and when the rest of us got there, the camp was theoretically all prepared and ready to go. John Grant was quite a character. He had a trailer he called his "pansy wagon," and he had quite a bit of it pretty well stocked with alcoholic beverages. And he was quite fond of those beverages; and every once in a while, I believe he'd get a little too much. Anyway, I believe there was one or two officers out of the state detachment who went down besides myself. Ed Norton was one. I think he went down at that time as a lieutenant, and there were others there, too. John Grant came to me, and he says, "You're going to be the supplies sergeant."

I said, "Oh? Well, what do I have to do?"

"Well," he says, "you got these supplies to check out here, and then—then, there's two

messes, of course. We'll have a mess sergeant for you in each mess hall, but you'll have to get all the supplies in. And," he says, "all groceries are contracted by different areas; the meat comes from a certain area, and some Japanese people furnish vegetables, and others furnish staple supplies." He says, "You have fifty cents per man per day to feed this gang. And, oh, by the way," he says, "here are some sample menus. You start out with the menus, make up your menus; then from that, you can estimate the supplies you'll need." And he says, "Well, the ammunition and rifles, and so forth, are checked out over in this building [waves hand]. Goodbye." I didn't see him again for about six or seven days.

In the meantime, I had quite a little responsibility. Somehow, I waded through it without previous experience, got the menus together, and we had a couple of cantankerous cooks who were enlisted to fill out the enlistment quota, and also enlisted because they had experience as cooks. And they were cantankerous: Nevertheless, I got the menus made out and began to get the groceries there, but I had to have an officer to okay the bills, and also to inspect the meats when they came in. An officer was loaned to me for that from another area. I don't know just how John Grant was supposed to've functioned down there, but I certainly saw nothing of him for some little time. Ed Norton was a great help to me. He was the lieutenant there, and he did help me out quite a lot. But I had very little sleep and lots to do, but I managed to stay within the fifty cents per man per day.

Come Sunday, the boys would like a little change. There was nothing like ice cream and cake on the menu, so we would put that down as bacon and beans, and we'd go up on top of hill to Atascadero and buy chickens, and we would buy ice cream. That went down as bacon and beans, but we managed it on the

money we had. So we gave them on Sunday a special treat. Of course, there were some enjoyable things about this. We did have a chance to go out to Pismo Beach and get a swim once in a while. However, I got very little chance to do this myself.

When it was all over, apparently, we got by. John Grant was fully recovered from his bouts with his liquid refreshments, and poured out two big whoppin' scotch glasses for Wayne Herberth and me. I couldn't finish mine—I don't like scotch, anyway. But he was a sort of a jolly fellow, that is, Grant, and he passed things off pretty well. Of course, he was supposed to be inspected by a government officer, that is, a federal officer, and I don't know how he got by there, but he got by in some way or other. But this was one of the things which sort of soured me on the National Guard, to get into responsibility like that, and have to take it. But I guess I had good luck, or something of the kind, because I did get by with it.

Another camp experience was up at Boise, Idaho. This was a very good experience. This occurred, I think, along in late June, about 1937 or '38. Jay White was along on this camp, General White. And I don't recall whether Norman Brown was there. I do not believe he was, but Norton and Lyman and Wayne Herberth, and I am quite-sure Swede Russell was there. Swede Russell, by the way, later became quite a man in the Guard. But we had this camp, and my job in this particular case, was more of shuffling papers and making out payrolls, and so forth, which was much better for me.

Mrs. Little had a cousin in Boise, Harold Houston. Harold was a mechanic for one of the big contractors up there, I believe Morrison-Knudsen. He was married, lived in Boise, and he was quite a flower fancier. I recall he had beautiful flowers in his garden, and vegetables, and he did a very nice thing

for us. He invited the entire state detachment from Nevada to go on a trip to Arrow Rock Dam and on over the hill to an area which was explored in the early days, and prospected for gold, and back through, I believe it was Idaho City, and we came back through what they called a sort of a "rainbow route," and we followed the stream. This was an excellent trip. Jay White and Norton and the entire detachment went along with Harold. One of those roads, he said, was so steep. We could go down it, which we did, but we would never get back that way. That was one reason we had to make the entire trip. What we did that day was to explore Arrow Rock Dam very thoroughly and follow this route back into Boise, and Mrs. Houston had prepared an excellent dinner, and we all had dinner at the Houstons' that evening. This was a very enjoyable trip, and it was an enjoyable encampment, as far as I was concerned, and I think the same could be said for the rest of the state detachment. There was no comparison between this one and the one which I had attended down in San Luis Obispo.

While in this camp, several of us went around town a bit. I had known some of the state highway department people from Idaho, and also, the Bureau of Public Roads man in charge of the Idaho-Utah work. We had some fairly good times together. And we met some aviators. I was invited to go on a trimotored plane for a round trip to Salt Lake and back, but I thought the better of it because I was afraid I would not get back in time for camp the next day. When we returned to Carson City after this trip, I recall there had been a tremendous freeze late in June, and my garden lay waste.

As time went on, it looked more and more like we might get into a world war. Jay White thought about it very seriously, and asked us to consider it, especially those of

us who were noncommissioned men, either privates or corporals or sergeants. In the meantime, of course, all of us had taken these correspondence courses. Some had taken 'em in the adjutant general's department, some had taken them in other departments. I had taken correspondence courses in chemical warfare and had been doing quite well. But a ruling came out, whereby anyone over forty years old, regardless of how many courses he had taken, could not obtain a commission. I believe that goes back to age thirty-five, instead of forty.

In addition to those I have named who were present at that meeting, there was Gene Robens. Gene Robens had worked in the Highway Department lab, and later was transferred to the testing department. But he was interested in the National Guard. He joined, and he studied like mad, and he passed his course, and he became a second lieutenant in the adjutant general's department. Gene was a young man, and he decided he wanted to stay in the Guard regardless of what happened. I mention this because he had quite an experience in the military in later years.

After discussing the thing among us, Jay White thought it best (that) those of us who were past the age to become officers should be washed out of the Guard because, he said, "If war does come and you boys go in in those grades, you'll never be able to make enough to support your family." We agreed, so I believe the last of the National Guard, as far as I was concerned, occurred sometime in 1940.

A word about Gene Robens—he went in immediately, into the service, in the adjutant general's department, and very few men had gone into that area, so Gene advanced very rapidly. He had sort of a speech impediment, but he was a very athletic fellow, very likable fellow, and he advanced very rapidly. And in just a year or two, he was a major, and he

finally was placed on Eisenhower's staff. And I'm not sure what he did when and if he got to Europe, but I'm sure he did, and I believe he stayed in the Army and made a career of it, and at the present time, probably has retired as a general, but I am not sure about that.

I might mention here, too, that the others, Norman Brown, Ed Norton, and Frank Lyman, stayed in their commission grade; and Swede Russell went into the service, I believe as a sergeant, and he moved right on up the line. Norton and Lyman stayed in this country in some capacity, probably in the adjutant general's department, but I'm not sure, all through the war. I don't believe either one of 'em got overseas. I'm not sure what Swede Russell did at the time, but later, he became head of the Nevada State Selective Service. He retired just this last year, with the retirement pay of a colonel, but he was given the honorary title of brigadier general upon retirement, which was conferred by Governor Paul Laxalt.

Of course, the federal government provided inspectors or/and instructors to the National Guard, and I recall the names of two sergeant instructors from the federal government we had while I was in the state detachment. The name of one was Kelly, Sergeant Kelly (I don't recall his first name), very efficient sort of a person. Another was Sergeant Bill Loeffler.

This ended my military career. However, after the war had started, I thought, in spite of my age, I could still qualify for a commission grade. I had excellent letters of recommendation from Norman Brown, Norton, and from Jay White, and others. I made two separate trips to San Francisco, one in an attempt to get into the Army. I did not succeed. I was told the same old story, that I was too old. Anyway, all these older fellows would do nothing but make casualties. Again,

I tried the same thing in the Navy, and got the same story. Thus, my military career never went beyond staff sergeant in the National Guard.

As far as my physical condition was concerned, I think I was in very good physical condition when I was age forty, forty-one. [I said recently], "I wish I had one of those officers with his feet up on the desk, telling me that I could make nothing but casualties because I was too old." I wish I had him with me last year when I was inspecting pavements and pipelines at the north side of Lake Tahoe, climbing forty-foot banks up and down all day long at age [sixty-nine]. I think I could've run the pants off those colonels and those high Naval officers [laughing]!

During the time I was chief materials engineer, I was allowed on two occasions to go back to the annual meeting of testing engineers. These meetings were held every year, but they were not actually attended by all of the testing engineers—perhaps as few as twenty percent. Westerners, being so far away, were seldom allowed by their superiors to spend the money to go. However, they were very interesting meetings, and useful. What happened at these particular meetings, the chief materials engineers would meet with the Bureau of Public Roads engineers and others and would discuss changes in specifications and needs for changes, but would not necessarily vote on those changes.

Specifications are a study in themselves. The American Association of State Highway Officials issues two volumes of specifications, one for specifications for the materials, themselves, and another for the test methods. And these specifications and test methods are continually subject to change as time goes on, and new developments and new construction methods occur. And one of the chief businesses of the chief testing engineer

is to keep as current as possible. We do it mainly by correspondence and by voting. Each man at his home station votes on the changes. Some of them are simply changes, some are new specifications, and some are called interim specifications, and interim test methods, which are tried out for a while by certain committees. And when they were found valuable enough, discussed at regional meetings or at national meetings, and the following year, votes are taken. These two volumes on tests and on materials, themselves, are supposed to be published about every two years, but it was my experience that sometimes, things were not got together fast enough, and that it might be a period of five or six years before new volumes would come out.

I mention tests at this time; however, the general public does not realize the volume of test methods and specifications for materials, themselves. Probably the principal organization is the American Society for Testing Materials, which covers engineers and chemists, and physicists, and other research men. It covers all their work and a myriad of materials, everything that you can think of in the construction industry, and many other things, leaving out foods and drugs, of course, and some of the other things. But even those have specifications and tests, but they're not covered in these two principal test volumes, that is, the American Society for Testing Materials, and the American Association of State Highway Officials.

Then there are other specifications and methods not covered by either such as for timber, lumber. The WCLA (West Coast Lumbermen's Association) and the PCLB (Pacific Coast Lumber Bureau) each has specifications for certain kinds of timber, such as redwood, and Douglas fir; and those specifications are usually referred to by testing engineers, and they also have copies

of them. And at times, in certain areas, testing engineers and their assistants will go out and make inspections of this timber. It covers piling and structural timber for bridges, and that kind of thing.

There are many other specifications. There are specifications for electrical materials. As a rule, the testing engineers, themselves, the state Highway testing engineers, do not do much of that, but they accept a lot of that material on inspection certificates by a certifying company.

Another way of obtaining tests when it is not feasible to send an employee who is qualified back East, or some long distance, to inspect a shipment of steel, say, or of paint, or some other material, we hire an inspection bureau. The Robert W. Hunt Company is one such bureau. There are many others. And we accept their test reports, provided the Bureau of Public Roads approves that particular agency. Therefore, we do not do all of our testing.

Now, let's go back to these meetings in Washington, D.C. I was privileged to take two trips back there. I believe the years I took those trips were 1964 and 1966. And I became fairly well acquainted with a number of testing engineers there. I am going to mention their names. From Arizona, there was W. G. O'Hara; California was John L. Beaton, who had replaced Francis Hveem; and Colorado was E. G. Swanson; Georgia, W. F. Abercrombie (he, by the way, was chairman of one of the subcommittees of which I was a member); and Idaho was H. L. Day; Massachusetts, John L. Lyons; Minnesota, C. K. Preus (he was, at the time I was back there, the general chairman of the testing engineers); New Hampshire, Paul S. Otis; New Mexico, Travis Cole; Tennessee, E. R. Manning; Texas, A. W. Eatman; Utah, W. J. Liddle; the state of Washington, C. E. Minor; Wyoming, James N.

Desmond (who later became the chief testing engineer [of the] state of Nevada). And two of the Bureau of Public Roads testing engineers, whose names I do remember were C. A. Carpenter and P. C. Smith. I mention these people as ones with whom I was quite well acquainted with. After the meeting, some of us had some very good informal discussions and some good times together. I recall, I believe it was 1964, when O'Hara and Beaton, from Arizona and California, and I went down on the Potomac for a shellfish dinner. That was really something, something, at least, that we desert rats didn't get a chance to do very often. I also had an experience with A. W. Eatman of Texas—the largest state in the union. In fact, Eatman had so many divisions (I think there were twenty-four divisions in his state) and so many laboratories, that it was hard to keep track of all of them. Well, anyway, through Eatman, I secured a little education on feeling for black people prevalent in some of the South. Eatman and I were both members of Rotary Club, and your attendance, of course, is required, and whenever possible, you make up. So, this particular day, we left the meeting just before noon; I believe that was down on Constitution Avenue (I've forgotten the name of the building), and we were to go up to one of these old hotels on up the street toward the Capitol, where the Rotary held its meeting. So I saw a taxi coming, and immediately hailed it. Eatman objected, "Oh! Let that fella go! I can smell 'em a mile off! I wouldn't ride with one of those niggers under any circumstances!"

Well, that sort of slowed us down a little bit, because quite a few of the taxi drivers were colored. Soon, a white man did come along, and we rode with him—went up to our meeting.

There are many committees among the testing engineers, and some that I've served on for several years were the pipe committees—

culvert pipes and drain pipes, corrugated mill pipe, for example, and petrified clay, and other types of pipe used in drainage, on various kinds of aggregates. There was a committee on concrete aggregates, for example, another on aggregates for surfacing materials, and for seal coats, and asphaltic materials, both in penetration grades and liquid asphalts. Much work over the years was done on the west coast on securing those specifications, much of it worked out with the Asphalt Institute people. And the committees on prestress concrete members, and many committees on the various features on soil. And the use of wetting agents to better distribute moisture in compacting subgrade. As I think I have stated before, in order to compact subgrade, there is an optimum amount of moisture. If you do not get quite that much moisture in, you do not get as good compaction as if you can reach the optimum. Then, too, if you get too much moisture in, there's a tendency for the moisture films to build up and make the particles swell.

Now, some kinds of material are very difficult to wet, especially if they are extra dry, so the use of wetting agents was coming into being about this time. Certain wetting agents will slip in under the adsorbed air molecules on the surface of the particles and cause general wetting to take place.

One evening, O'Hara, and John Beaton, and I walked around a street in Washington, and we went into an old colonial house. It was just a few blocks from the White House, and the one feature which was remarkable in that house was the inlaid floor, made from many, many woods. I believe that house was built sometime in the eighteenth century, probably the middle or late eighteenth century.

I believe this was the same year where I had a little extra time before I took a plane back for home, and I had a chance to go

up to the Capitol and look around there. I tried to call on Senator Bible, but he was out. I did manage to get in contact with our congressman, Walter Baring. Walter had had a bad day that day. I believe he'd lost his glasses, and he had quite a few other troubles, but we had an enjoyable conversation. I had discussed a little about my convention and what we testing engineers were doing, and, of course, he was very interested in road building, and particularly on the development of freeways, and where they should be placed, and where they should not be placed. But our discussion couldn't last too long. He was a busy man and had a lot of things to do. I also got a chance to take one of the conducted tours through a portion of the Capitol building, and got back in time to get on my plane.

Now, I believe it was this particular time, when I was supposed to take an Eastern Airlines plane and drop back down to the South, and meet my wife there at my youngest daughter's residence, Mrs. Eidson. Mrs. Little had flown down from Chicago, and I had arranged with the state Highway Department to take a week's vacation after the Washington meeting. However, the particular plane I was to take for Birmingham was delayed four hours on account of trouble. I finally got onto the right plane, but in the meantime, when I got into Birmingham, my daughter and son-in-law had waited four hours for me, and we had a hundred miles to drive back to Haleyville, Alabama, where Jim and Elaine live.

My second trip back to Washington was made without delays, and I believe that was 1966. Some of the discussion in earlier meetings had to do with nuclear instruments for use in testing. The materials committee, after finishing their work, were requested to stay an extra day in session with some of the Atomic Energy Commission people, who

were doing quite a little work in connection with the Highway Research Board. But we listened to quite a little talk by some of these men, which was more or less restricted. We were not supposed to at the time, to tell what had happened. They had what they called the Plowshare Program, discussions of what could be done, what might be done with nuclear power, and discussions of some of the costs of nuclear power as against conventional blasting, and so forth. Although it sounds sort of fantastic, it was mentioned that it might be possible to create new harbors in rock-bound coasts by using atomic blasting. This is something which I hear very little of at the present time. Not too much was known at that time about the detailed precautions for safety, and I imagine some of these huge projects would be so unsafe that they would not be practical.

We were also told about some of the practical nuclear things in some of the states. Particularly, Texas had already done quite a little work on nuclear instruments to check moisture content and compaction of subgrade and base materials. The Traxler instrument had been invented, but the testing engineers hadn't found it very practical. It needed some changes. And Mr. Eatman of Texas said his men had worked it over 'til they were beginning to get good results.

Another bad feature of the new nuclear tests was the cost. I believe some of these instruments, when they're first put on the market, came to as much as four thousand dollars.

The discussion in Washington, D.C., on the Plowshare Program was handled by several men whose names I don't remember. I remember one who was a Mr. Spence of Washington, D.C. There were several others, but, at that time, I did not know just who they were. However, a Mr. Hughes of

Virginia discussed the use of the nuclear instruments, and he had done quite a little bit on the asphaltic concrete, using the nuclear instrument to determine asphalt content and density of asphaltic concrete. But most testing engineers agreed the more practical thing would be to check subgrade moisture and density, and base moisture and densities. The old-time methods of using a compaction tube were so slow that the nuclear instruments really should have a great potential in saving time, and, actually, saving money. A single operator might be able to do the same work that three or four could do with the old conventional methods. In spite of the high cost of machines, this probably would be the cheapest way in the long run. Later years have proved this out.

In the second meeting, quite a little discussion was held on increasing the duties of what was called the materials reference laboratory. I'll have to explain that. For a number of years, the Bureau of Standards had what they called the cement reference laboratory. And traveling testers would travel all through the states about once every two years and check the test methods and procedures on testing Portland cement. Now, it was proposed that this be increased to check materials, and equipment, and procedures on some of the other things. This particular thing was brought up on a ballot. Mr. [H. L.] Day made the motion. Some of this voting was done orally, and some of it was to be done by the engineers at home, but we did vote on [Mr. Day's] motion to increase the materials reference laboratory inspection to other items. That was voted and passed.

In addition, a good many suggestions were called to the attention of the testing engineers on closer control of such items. One was sampling of bituminous materials without contamination. That is, it has always

been a bugaboo for all testing engineers to avoid contamination in sampling bituminous materials. Fouled up containers or carelessness of the samplers can very easily throw bituminous material out of specifications.

And the second one was holding a school for contractors and their operators in asphalt mix proportioning. Most of us agreed that would be a good thing to do.

The third one was bringing up the need for specifications on lime stabilizing base and subgrade aggregates. Lime, as a stabilizer, was being used in several states. Sometimes it was cheaper than cement and would do as good a job.

And a fourth thing was to expand paint specifications to cover traffic line paints. Heretofore, there had been nothing in the standard specifications of the American Association of State Highway Officials on traffic paints. Each state had its own particular specification. As a matter of fact, the state of Nevada used the same specifications that were developed by California for many years.

Then a fifth suggestion was to revise the 1963 specifications for cationic emulsion, but [to] retain it as an interim specification for the present.

I mentioned before that the testing division was able to move into the new laboratory in September of 1964. However, the main administration building was not finished at that time. Therefore, it was not ready for occupancy until 1965. And the building was dedicated in June of 1965. At the time, of course, the board of directors were Governor Grant Sawyer; Keith Lee, state controller; and Harvey Dickerson, attorney general. And the Highway chiefs were Otis Wright, state Highway engineer; and John Bawden and Reuben Eldredge, deputy engineers; and Denton Hayes, the administrative engineer.

A pamphlet was issued, showing all the floors and occupants of the various sectors. A copy of this is available to anyone who wants to go through with that part of it. But a little write-up was made on the back sheet of this circular. The contractor on this job was Dixon and Tiberti; architects were Ferris, Erskine, and Calef; and Joe Boniface, representing the Highway Department, as resident engineer.

The last sheet of this circular gives a little bit of history about the Highway Department. They started out in a very small way, occupying the top floor of what was, until recently, the state printing office east of the capitol grounds, and later on, they transferred over to the Heroes Memorial Building, which later, housed the state Department of Health and other offices. And then we had such growth that it was necessary to build a new building, which was done, and the new building was on South Fall Street, just southeast of the capitol building. However, other people were occupying that building, besides the Highway Department. Of course, the testing department was there for a while, too. And it became necessary to increase personnel because [of] the increase of work, so after about twelve years, the Fall Street site was outgrown altogether, and the new office building was ready in the spring of 1965. [It was] a four-story structure, and the testing laboratory was adjacent; and it provided a third more space than the previous building because this new building had eighty thousand square feet of floor space. And they used reinforced concrete in the floors, and walls, and supporting structure.

There was quite a little trouble in this, with water, at the time the basement was excavated. I personally was called in on the water trouble, not only on the basement of the Highway Department building, but on the new school, which was built on [a] former

part of the Winters ranch in the west part of Carson City. There were actually some underground streams of water, carrying not a big volume, but carrying plenty of water, so arrangements had to be made to remove the water. In the Highway building we had to put in pumps, and those pumps work constantly. In the new high school, all we had to do was prepare rock drains to get rid of the water.

I had some personal experience with my own property in Carson City at Angus and Mary Streets. I recall several problems with water. One winter, a foot of snow in the field (it was a field at that time) just west of me was doused with a strong rain, and the water flowed out over the land, put out all the floor furnaces on my neighbors who had floor furnaces, and got in under all of our houses. We had to pump it out. Of course, gopher holes helped quite a little bit on that.

And another time, one of my clothesline posts needed replacing, and digging the hole for the post, water began running out of the ground. The water, for many years, was practically on the surface in some areas in Carson City. The only way I could get that post set was to go down to the laboratory and obtain some samples of tested asphalt and crowd those in with bars and tampers in order to get the post to stay solidly in the ground.

A high water table is characteristic of quite a lot of Carson above the fault scarp. The fault scarp runs through Carson in a southerly-northerly direction, and then changes to a northeasterly direction. It runs under one of the old schools, and the Methodist church, and one of the new schools. It runs under the main highway, [U.S.] 395, just above the Dutch Mill, and clear down around by the old Ada Jones place, and splits off, and part of it heads toward the hot springs. There was quite a problem in building a new highway on Carson Street, and I personally supervised

some of that, and made a recommendation which I think has cured that water problem.

There were wet spots in that old pavement because of the high water table above the fault scarp. So we excavated rather deeply, and spent quite a lot of money putting drain rock underneath, and a herringbone system of tiled drain. There's been no problem since that time. However, that was a very expensive thing to do, but it did the job.

I think I should mention something about the service records. It has been the custom, each biennium, of the department to award service records to people who have worked for a long time in the Highway Department. They start out usually with those fifteen to twenty years, then twenty-five to thirty years, and thirty to thirty-five, thirty-five to forty, and if they have anybody, forty years or more. I'm discussing at the present time, first, just the laboratory people who obtained these awards at the end of the twenty-fourth biennium.

Thirty to thirty-five years was L. W. Little; and twentyfive to thirty years, Mary Rochon (who, at one time, was secretary of the laboratory), and Milton Ross, who was our field man, and also had worked in the lab for many years. Twenty to twenty-five years, there were two: Edward C. Marriage and Norman D. Noteware. (Marriage later—after he left the lab, he became district engineer at Ely, and finally, construction engineer.) Fifteen to twenty years, there was Albert Barego, who worked in the lab a short time, and John Flournoy, who worked for several years in the laboratory, but later worked in the planning department, then finally in the rightof-way department. And there was Harold G. Kispert in that section, also. Hal was in charge of our concrete laboratory for many years. Then in the fifteen to twenty years, there was J. H. Morgan, and John J. Quinlan, and James Sullivan. Morgan had

worked both in the field and in the lab, and Quinlan had been office man and tester in the lab, and he had also become storekeeper in the general department later on. James Sullivan had become my chief assistant. Sullivan had been in the service, and after he came out of the service, he took over his father's cigar store after his father's death, and worked there about five years, and then he came back to the Highway Department.

Now, I think we should mention those people who had worked forty years or more. One was G. F. Armstrong; another was Ernest C. Cross. Both of those men were chief maintenance men in Districts Two and Three, respectively. And Marion I. Schultz, I do not know much about her. And W. O. Wright, who had gone through all the engineering sections from resident engineer to division engineer, and was finally state Highway engineer.

Now, those who received thirty-five to forty years were Reuben Eldredge, who was finally made assistant state Highway engineer; James A. Parry; Dale V. Rose; and Marvin H. Waite. Rose and Eldredge had both been resident engineers, and Dale had been district engineer, Eldredge an assistant, and finally, an assistant state Highway engineer.

THE TWENTY-FIFTH BIENNIUM

In referring to the 1965-1966 biennium, the board of directors were the same as in the previous biennium: Governor Grant Sawyer, chairman; Harvey Dickerson, attorney general; Keith Lee, controller. And the chief engineer, W. O. Wright; R. E. Eldredge was the deputy; and John Bawden, also deputy. However, there was a change July 1, 1966. Otis Wright was in rather poor health for quite a number of years, but in spite of all of that, he did a marvelous job as state Highway engineer. But he had to retire on account of

health, principally. As a matter of fact, he had many, many years of service, but he did this in July first, I believe, 1966. And John Bawden was elevated to state Highway engineer. And R. E. Eldredge had been in what was thought to be some kind of trouble, and I believe his health was a little bit bad at the time, and George Griffith was brought in. George had been a resident engineer and had also worked for Dodge Construction, so he was very familiar with highway materials. He was brought in to succeed, at least temporarily, Reuben Eldredge. Denton Hayes continued through both of these administrations as administrative engineer. And other employees stayed pretty much the same, although there were some changes in the subdivisions. I will not try to explain all of those at the present time.

However, another thing happened here. It was instituted by W. O. Wright. There was a problem with claims, contractors' claims. And for quite some time, those claims apparently had been settled by conference between the deputy Highway engineer, and the construction engineer, and the contractors, and no one else. This, for several reasons, was thought to be a rather poor policy; not that there was any indications of dishonesty anywhere, but there were not enough people concerned with the various things, such as the legal angles, and other administrative angles in settling claims. Therefore, it was thought best to institute a claims board. Then there was quite a little talk at the time about a hidden briefcase containing these contractors' claims. And the briefcase was in the custody of Gerry Wolverton, who had been appointed, at least temporarily, as construction engineer. And Gerry and Reuben Eldredge took care of most of the claims.

Now, there was a lot to be said for Reuben Eldredge. He was a good engineer; he was

a hard worker. His disposition sometimes wasn't always the more pleasant, but he should have a lot of credit as a state Highway employee. This matter of claims came up, and I think he resented to some extent, possibly, the fact that it was taken out of his hands. He thought probably that was not justified in doing that.

Nevertheless, a claims board was appointed. And the first board consisted of the following people: the chairman was a man by the name of Leonard Lindas, a lawyer who was brought down from the state of Washington. He represented the administration and legal services, and the right-of-way. Then G. K. Wolverton, the construction engineer, represented construction, and he was later replaced by Ed Marriage, who became construction engineer. Wolverton apparently did not like the discussions that were going on, so he resigned from the state Highway Department and started working for a contractor down in the Las Vegas area. Then Remo Albertini represented the internal audit, and L. W. Little represented the materials department as chief testing engineer. Later on, an attorney was added. And Kay Millard was the secretary.

Actually, this claims board did not always act in Carson City. We would travel to the site of the contract in many cases because we had a chance there to discuss the contractors claims with the resident engineer and the district engineer, and with inspectors and others who would know what was going on. Lew Gourley was our pilot. We had a six-passenger plane, and we made many trips around the state on claims.

Contractors' claims sometimes were quite heavy and frequent. For example, storm damage to a road already partly built was usually a good reason for the contractor's claim, for extra work. Extra work, mostly,

was the problem. And some things were legal, and some were not. That's why it was very important that we had legal people on this board.

It was interesting work. My particular part of it had to do with materials, acceptable materials or failing materials, some materials which had been placed on the road, for example, and found outside of specifications badly enough that some kind of action had to be taken, either removed, or some ingredient added to improve the quality. Those kind of things were always claims for the contractor, and they had to be settled one way or another.

This claims board was able to function at any time. However, practically all of the work was done by Leonard Lindas—that is, the recording, and the write-ups, and so forth. Our recommendations were not final. The recommendations of the claim board were turned over to the state Highway engineer, and it was up to him to make his recommendation to the board of directors regarding the claims. But he had something definite to show them, and the opinions, and all transactions regarding the claims were written down so he could show the board of directors something very definite, and had something to go on. And I believe in practically all the cases, the Highway engineer's recommendation, on the basis of the claims board work, was followed through by the board of directors.

I might cite one example of claims. One contractor had a job in Elko County on a freeway, and the gravel he produced was not always inside specifications, and a considerable amount of the gravel had been rejected. However, when the claims board visited the site, I personally sampled stockpiles, with the help of others and in the presence of other people so that everyone could see how the samples were taken.. Those were brought back to the central laboratory

and tested, and from the results of those tests were determined what should be done. And heretofore, some of those things may have been partly overlooked. I wouldn't say that that is true, but I know that this was a lot of work and a lot of testing on my part.

Now, there were other claims which had to do with costs of materials, or something legal, which I did not take a direct part in, although I heard some of the arguments. But I just cite this as one example of a thing that can happen.

The contractor, of course, was delayed in his work when we do not accept stockpile material already prepared; and, of course, there was some justification that he should be compensated in the manner for what he had done, and for the delay, because he had to keep all his employees on the job. And the things of that kind had to be discussed and worked out between the contractor and the claims board, and then we made our recommendations.

Some of the claims were settled in Carson City, where the jobs were nearby. But for those few years, until 1968, the claims board usually flew to the job sites where they could study it. I think since that time, a change has been made, and the engineers and the contractors concerned with any particular job come into Carson, and the claims board meets in Carson at the present time.

The Highway Department expanded greatly, of course, during the 1960s, all departments. Each one deserves, a lot of discussion, and a lot of write-up, we'll call it, but my particular job is to emphasize the materials and testing, and I'm sorry that I was not able to say all that should be said about some of the other very fine departments.

For this 1965-66 biennium, I will describe some of the happenings in the laboratory, and indicate something of the growth. Of course, we had moved into the new building,

which was very well departmentalized, and we thought we had plenty of room to handle things. Of course, that is never the case in this growing state and growing country. At the present time, 1973, the laboratory had to be enlarged to accommodate a new kind of testing machine. I will describe things pretty much as they were in the biennium 1965-1966.

The laboratory's regular staff was increased by about twenty-five percent. I believe we had around forty-seven regular employees besides the—[in] the summertime, we would. put students to work, and we would put to work professional engineers just going out on their own.

Refinement of procedures and development of new equipment were made necessary because of the increased importance of testing. Everyone seemed to be testing conscious, more so than they had ever been before. In 1965 and '66, we made more than 141,000 tests. That does not necessarily mean there were that many samples, but there were that many various kinds of tests on construction materials ranging from the natural subgrade soils to tests on synthetic things, such as synthetic textiles. And textiles are used in the Highway Department in canvas, and at one time, we tried to stabilize roads by putting down layers of canvas under the roads.

A good many new specifications have been established, and they seem to become more and more rigid—at least, the federal requirements were, and the contractors, of course, have to comply with those. And to insure that the contractor adheres to the standards, much more field sampling and inspecting was necessary. The so-called Record Sampling Program has been discussed before, and I believe, it was the thought of the Bureau of Public Roads that there should be

tests made of all the things put into the road, especially the aggregates, hopefully, to give a permanent record of what is there. Of course, a lot of us who have been around a long time know that degradation takes place by use, and those things put in the road today will not be of the same gradation or the same quality ten years from now. Nevertheless, the Record Standards Program has some merit.

The testing department is more or less a service department, as has been described many times before. We worked very closely with the construction department, and with the bridge department, right-of-way department, and design. Much of the work in design, the groundwork for it, is built up by the planning department, who prognosticates the kind of traffic we will have, say, twenty years from now. Then, when that information is given to the laboratory, it can set up for the wheel load [and] can set up, then, a basis of how thick the base materials, the surfacing materials can be, and which would be the more economical—to use cheap aggregates, a lot of that under the base, or cut that down and use the more expensive surfacing materials, like Portland cement concrete, or cement-treated base, or asphaltic concrete. So we worked at the laboratory in connection with these other departments: maintenance, construction, design, planning, right-of-way. The right-of-way department, our contacts with them were important because we must know who owns these gravel deposits we develop, and the cost, the royalty, and whether or not we can get permission to go in and prospect. As a matter of fact, the accounting section has close relations with the testing department, and the legal department. We were a service organization that was shown in the organization's charts as one little branch of it all, but we have dealings with everybody else.

We established six major sections in our new laboratory in lab and field work. The field work consists of two areas: preliminary investigation of materials sources. We had done that for years and years. (I wrote a paper on it, and delivered it in Salt Lake City, Utah, some time ago. I don't recall at the present whether that was turned in to Mrs. Glass, head of the Oral History department, or not. If it was not, it probably has gone by the wayside.*) And we also worked in the field during construction, testing these so-called record samples. And presumably, the field personnel were not to be trusted with that; that was to be done by the laboratory. At least that was the Bureau of Public Roads's insistence.

That was one section—was our field work. Another section was the chemical and metallurgical section, and then another section where the testing of roadbed aggregates was done, another section where the structural materials was done. Bituminous mixes constituted another section, and the asphalt, another. Soils and foundations were made into a separate section and put under the direction of Don Collins. I think it was mentioned before, that when that room was built, we did not put any furnishings or any equipment in there. We left it all to Don, who came along as our soils engineer, and let him equip it and staff it with whatever and whomever he needed.

At this time, it was necessary that we keep a full-time geologist. We had Tom Cordova as a geologist for several years, but he left us. So we gave an examination and secured another full-time geologist. At the present time, 1973, I believe the whole geological department was shifted over to the testing department, and I believe there are at least four geologists in that department at the present time.

Quite a few changes have been made since 1964. In this particular biennium, we used

experimentally a Cenco Moisture Balance, which will give quick determination of moisture on the roadbed materials. This can be used out in the field. And tests were also made out in the field with an experimental nuclear machine called the Lane-Wells Road Logger. This was a very expensive machine, the rental was high, and it was not amenable to moving around from one job to another at long distances apart. But where we were building primary roads, or freeways, and we had several jobs located near each other, such as in Las Vegas, it did make a good machine. And we tried out the Lane-Wells Road Logger for quite a time in the Vegas area, but I believe that has been abandoned since this time.

In our chemical laboratory, Budd Rude, who was in charge, secured a Beckman spectrophotometer, and a Leco Carbon and Sulfur Determinator. This equipment is valuable in the fast testing of paint and related materials.

Another thing we had done in the laboratory, we had introduced a school system (we had not introduced it; it was introduced by the Highway Department, but we did our part in it). And these new engineers just out of college and others would be put in a rotating system [and would] go from one section to another; and usually, we would keep them in the laboratory for a four-month orientation period so as they go out on construction in the field, they would know quite a lot about the physical and chemical tests which had to be done.

Another item which the testing department was mixed up with, we might say, was the landscaping aspect of the beautification program. This involved the use of fertilizers

*See Little papers, UNR Library

and mulches and some bedding materials and even decorative rock, and such things as tree bark, sprinkler systems, and planting stock, and the laboratory was called upon to do some of this. I, personally, am accused of having a green thumb, and for many years, I've had my fingers mixed up with the landscaping thing. I think, instead of a green thumb, I have a strong back and weak mind. I've done pretty well after making many mistakes, in the landscaping and floriculture, and gardening. As a matter of fact, I served on the examining committee for all the landscape people who were in the Highway Department at the time I was chief materials and testing engineer.

It was necessary, during this biennium, to assign more people to some of the sections. Several employees were assigned to the asphalt section to conduct extraction tests as a part of the record sampling program. And these tests, of course, are made on samples taken from the field; and the amount of asphalt is extracted, and also, a gradation of the extracted aggregate is made to see how it has degraded or whether it is reasonable within specifications.

The field work on record sampling required us to put in more personnel. It usually takes at least four men, almost full-time, on this particular activity. One man, Bob Widaman, an ex-mining man and mining engineer, was put to work in one of our office[s], and his job was to act as a full-time delineator on sketching material deposits and determining the amount of materials in deposits, and to maintain the records of tests and descriptions of material sites and a materials packet that accompanies the special provisions for each contract. And he also functions as a program evaluation research technique coordinator for the testing division.

The soils and foundation section has finally become very well equipped with

apparatus to perform certain tests, such as unconfined compression, direct shear, triaxial shear, with both constant and variable lateral pressure, consolidation and permeability, and tests to evaluate the ability of aggregates to withstand wear from traffic and deterioration from oxidation and wetting and drying. A degradation test is the name applied to this kind of a test. Don Collins brought quite a lot of information with him, and he had made quite a few studies where he was employed prior to coming into Nevada.

During this biennium, increased use was made of cementtreated base. Sometimes, aggregates cannot be found in nature which are amenable to highway use, amenable, that is, to the supporting the terrific loading required. They may contain just a small amount of montmorillonite type of clay, or some other kind of clay material, which weakens it so that it has but little strength under heavy loads. And instead of going a long ways off and spending a lot of money, simply hauling in good gravel is sometimes cheaper, and, as a matter of fact, better engineering practice, to add a certain substance to this kind of gravel, making it usable. We found that by adding small amounts of Portland cement to clay-contaminated gravels, we can change their characteristics so that they will support loads equivalent to those, or even better than those, made of ordinary but well-graded nonplastic materials.

One other item investigated to some extent by the laboratory during this biennium is the evaluation of lightweight aggregates for use in concrete. For example, by use of lightweight concrete, less foundation is required to support the static loads of the structure, itself. For example, a good, sound, lightweight aggregate made into concrete may weigh only seventy percent as much as an ordinary, high specific gravity concrete.

That means that you can lessen the structural section, foundation section. And considerable work was done on that during this biennium.

At this time, I am going to list the names of the materials laboratory people who received service awards during the 1965-66 biennium. Starting out with the thirty-five years, there was L. W. Little. There was no one in the thirty-year section. The twenty-five years, there was John Flournoy, an ex-employee, and J. H. Morgan. In the fifteen-year series, there was Paul Reuben, who was in charge of the roadbed aggregates laboratory.

Three of our people retired in this biennium: Robert G. Whittemore, who had been in charge of the asphalt laboratory; and George V. Allison, the chief assistant in that lab; also, J. H. Morgan. Morgan had been a field employee of the Highway Department for many years, and he worked part of the time in the laboratory. Bob Whittemore had contracted a cancerous condition about the year 1964. It progressed steadily until he was no longer able to work. He had to retire, and he passed away January 23, 1966.

Bob was a native, I believe, of Nebraska, had lived in Colorado quite a number of years, where he ranched and taught school. And he came to Nevada, where he taught high school in Douglas County, and then in Carson City for several years. He came into the laboratory, as I recall, in either the late forties or early fifties. He eventually was placed in charge of the asphalt laboratory. Bob was the father of three boys and a girl. One of his sons, the second one, was, I believe, a commander in the Navy, and as far as we know at the present time, is still on the missing list. He was in the Vietnam area. And his oldest son, Robert Whittemore, is a Ph.D. and in [the College of Education] at the University of Nevada. And the youngest one, Alan, has his Ph.D. in chemistry, and he is a chemist of some note,

has worked both in Denver and in Minnesota. Mrs. Whittemore worked for the state a number of years. She is still living, and resides in Sparks. She is quite a gardener.

George Allison raised three boys. I believe they're all college graduates. The oldest boy, I believe, was one of the recipients of the Harolds [Club] scholarships at the University. He is now a lawyer, practicing in Carson City. I don't recall right at the present time what the other boys are doing. Mrs. Allison was a registered nurse. She is a widow. She still lives in Carson City. George passed away in March of 1966. He was our head man and the chief assistant in our asphalt lab.

I might mention some of the service awards of long records. G. F. Armstrong received a forty-five year award in this biennium. I'm not sure whether or not he retired, but I believe he did. [Consulting papers] Yes, he did. As I look over the retirement list, Armstrong did retire. And Dale Rose, who was a resident engineer for many years, and then promoted to district engineer, wherein District Six was created at Winnemucca, received a forty-year award. He did not retire until later. Then there were five people besides myself who had the thirtyfive years award. There was Charlie Brown, an ex-resident engineer and division engineer, Tonopah; Victor Clyde, who had been a resident engineer and was also head of the construction department and the maintenance department, also; Francis J. Harmer (I can't remember just what Harmer's occupation was); Denton Hayes, who was an ex-resident engineer and a division engineer, and finally, administrative engineer in the Highway Department; Al Kinney, A. G. Kinney, was an ex-resident engineer, and also, for many years, was chief of the design department, and, I believe, was made a head of design and several of the other departments in the drafting area. Al Kinney continued on.

He did not retire until later on. But he finally retired and passed away just a couple or three years ago from a severe case of emphysema.

During the many years I spent in the Highway Department testing division, some of my time, and some of the time of a number of the employees, was spent on research. However, we had a rather difficult time of sticking to the job, so to speak. We had, to begin with, very few employees; and while we had several things which were different from each other (that is, several tasks to do), most everyone, except the chemists, became a jack-of-all-trades, where he could do work on asphalt tests, and go from there to concrete materials, and go from there to foundation materials. And we did that through the construction season. The high points of the construction season, of course, were the months of about April through October. However, we always had some work, because all the testing was done at first in the main laboratory. [In] later years, we did establish a laboratory in Las Vegas. But construction continued all through the year in Las Vegas, so we always had some routine tests. However, from the months of about the middle of November to possibly the first of April, we had spare time. And in those spare moments, we tried to do special projects which would do some good to us, or maybe help others. For example, we may want to experiment with some kind of a test which would save time and yet would give us better results.

I first came into the Highway Department as a part-time chemist on weekends, and finally as a chemist, but went from there very shortly into routine tests on asphalts. And one of the first things I noticed was a peculiar behavior of some of the residues after distillation. There was a test which was in the American Society of Testing Materials manual, and later adopted by the American Association of State

Highway Officials, which was called the float test. That test was presumed to be adaptable to giving definite values on the consistency of certain residues after distillation, residues which, when cooled, were not exactly hard, but were semi-soft. They would not pour, but they were too hard to run through a tubular viscosimeter, and were too soft to measure by means of a needle-type penetrometer. So a device which consisted of a brass collar with an opening at the concave end in which was screwed a small hollow cap—. The hollow of that cap was filled with the asphalt residue and kept at a certain temperature for a certain length of time, then placed in a water bath at a certain temperature, and a stopwatch was immediately set at the time that it was put in there, and the time was taken for the water, at a warm temperature, to melt this material, and the water would then, after the material would melt, come up through the float collar and sink it.

Well, that looked like a pretty good test, but I found problems. In particular, it made a great difference on the temperature at which the residue we wanted to test was put into the little float collar. If you put it in extra warm and ran a test, and then did it again, by putting it at a cool enough temperature that you could barely get it to fill a cup, you would get different results, and that bothered me very much. However, I did not carry through the research on it, but in later years, when we had an asphalt department, I mentioned this. Jim Sullivan found the same thing when he was head of the asphalt department, and when Bob Whittemore took over after Jim was appointed as my assistant, the same thing was found. And Bob Whittemore's assistant, next in line to him, was George Allison, George V. Allison, Sr. And George became interested, and one winter, when there was not much doing in the way of routine tests, George took

the time to do considerable research with it. And he found the same things I had found, that the temperature at which the residue was poured made a difference in the results. And he wrote a four or five-page dissertation on this. At that time, there was a new type of viscosity, that is, new to the testing in my office, called kinematic viscosity. And George compared kinematic viscosity with float tests, and this paper is interesting. The results of this paper and other results finally led the Asphalt Institute and the Highway engineers to throw out the float test. I will describe that a little more. This is just one kind of research we did.

Now, as time went on, and we had more people working for us, larger staffs, and after we had moved into the newest laboratory, adjacent to the new Highway building, we then had research projects which we could follow through, perhaps more than just the three or four winter months, maybe follow through for six months, or maybe for a year or so. We had the personnel to do it. Quite a little work was done by Mr. Don Collins in research on foundation materials and degradation of aggregates. Those things will be mentioned by me a little later when I describe some of the things that happened in the later biennial reports.

I think I mentioned some time ago a piece of work that I had done, that is, I had our tester, William Robohm, do, on mixing Portland cement with a finely ground silica, making what is called a slow-setting, low heat of hydration cement. And the results from those tests over a period of time were shown publicly, you might say, to anyone who wanted to see them. The state, being a public institution, we thought the information was for everybody. We didn't make much effort to publish them, but the results were there. And that research which we had done was followed through by some of the cement companies,

and finally resulted in establishment of the low heat of hydration cements, some of which were used in Boulder Dam and other places. And that's a standard type, now. I think there are five types of cement. But what little time we spent on research did some good.

There are other times some of our research ended up in zero results. I can recall one time when I first started testing asphalts. I thought it would be very interesting if we could measure the adhesiveness of asphalt. So we got an instrument called an adhesiometer, and we thought we improved it some; and a flat disc [of] asphalt was placed between a disc on a plate, on a platform, and a moveable disc, which could be pulled up and down by a certain force. The asphalt would be placed there. We tried to keep the temperature constant, and then measure the pull. Well, the asphalts are so different, due to the source of the raw materials, and due to the methods of refinement, and due to the myriad of combination[s] of molecules, that adhesion varies, you might say, terrifically, and that no real finite results could be obtained from that. I think I wasted quite a little bit of time on that, but one thing is certain: we learned not to waste any more time, which helped some.

Now, on going back to this float test, in describing what happened there, that matter of temperature at which the samples were poured or placed in the little receptacle, that problem had been discovered in other fields. There were a couple of young biochemists, about 1927, whose names I'm unable to find, but they were playing around with colloidal materials, and they were looking for a term to use for this peculiar problem, where something could be heated and cooled, and would jell, then, without changing the temperature at all, it could be stirred, or struck or something like that could be done to it, and it would turn back to a liquid state

isothermally (meaning without change of temperature). So they apparently looked up some Greek words, and they found two, which they put together, in a manner of speaking, and they called the term *thixotropy*. They took the Greek word *thixis* (meaning touching or striking) and they combined that with the Greek word *tripo* (meaning to turn or change), and this phenomenon of changing from semisolid to a liquid state isothermally by means of agitation then had a name, *thixotropy*.

Now, over the years there were several meetings between the Asphalt Institute members and the testing engineers all over the country, in particular where asphalt was most used, on the west coast. And the asphalt engineers would prepare programs, and different members of the institute and testing engineers and others interested would appear on a program describing research which had been done or problems, or one thing which we had done over the years was to simplify specifications. I've mentioned this before. From a great number of specifications, we finally boiled it down to five specifications for penetration grade asphalts depending upon the hardness. And we boiled it down to probably not more than twelve liquid asphalt types and a few emulsions. That was all done through cooperative research and correspondence over the years.

I recall one such meeting held in San Francisco, May twelfth and thirteenth in 1967. Now I'm taking this as a little out of context with respect to chronology, but I think I'll bring this up [at] this time because it has to do with this problem of *thixotropy*. George [Allison's] paper had been distributed before and other people had done research on this. And it was left up to me to sort of put the final touches on the thing. And we decided we'd vote on it at this conference.

Several things happened at the conference which were not too pleasant. I'm going to mention at this time, that just prior to my place on the program a Dr. Smith, a fellow of small stature but who had done considerable research (I believe he's working for Standard Oil), was to appear. I've forgotten his topic now. But in the meantime, Went Lovering of the Institute and I think another fellow helped me get my program ready. I had some charts and those charts were put up in front there where they would be available when my turn came to speak. Well, Dr. Smith came down to me sort of boiling mad. "Get those things of yours out of there because they're going to disturb my speech." I kept my anger to myself but I conceded that probably that would detract a little from his talk. But he had no reason to approach me in that manner. So I had the boys just turn the sheets over but put them all in one pile. And actually I couldn't tell you what his talk was about, but he didn't stay to listen to mine, and I'm sure I didn't listen to his [laughing]. Well, anyway, when my turn came I reviewed Allison's work and showed the charts and so forth. And we put the matter to a vote and we voted to discontinue the float test as a measure of the consistency of certain residues after distillation.

The Asphalt Institute people were very kind to us in a matter of entertainment. On that particular trip, there were four of us from the state: Keith Layton, who was at the time appointed deputy chief Highway engineer, in charge of—well, he was over the construction and maintenance and laboratory; and Ted Bertelson from the construction division; Dudley Kline [Jr.] from the laboratory. Dudley had taken the place of Bob Whittemore, and of course, Bob Whittemore and George Allison had both deceased at the time. And I made up the fourth member. We were taken out to a very fine dinner, I think that's on the

west side of Union Square. I've forgotten the place; it was in some famous alley. The dinner was beautiful. Then those fellas thought we should have some entertainment. So he took us somewhere (I don't know just where it was), out to North Beach or someplace, where they had the topless dancers. As a matter of fact, all the gals in there were either topless or semitopless—cocktail waitresses and all. The four of us were seated around a table and a man and his wife—they were strangers to us—were at the same table. There were a number of those tables. I felt sorry for these poor gals, to earn a living like that. And these gals would get up on the tables and do their dance. They were clad with nothing, the upper part of it, and the rest of it was a lower half of a micromini bikini. And they would do their dance which [is] kind of a little step. And I remember Dudley Kline was very courteous, he took the gal by the hand as she came and helped her up the steps to the table and sat her down. And she hadn't danced very long until this lady across the table looked over and saw my white hair. She had heard the boys call me "Prof," but I don't think she remembered just what that word was. "Well," she says, "Pops, what are you doing in a place like this?"

"Why," I says, "Lady this doesn't bother me at all. When I was a boy I used to pull on those things to get the milk out of the cows [laughing]."

Keith Layton, who happened to be seated by the husband of the lady, overheard him tell her, "Honey," he says, "I guess that'll hold you and keep you still for a while."

In 1966, the election of state officers resulted in a Republican governor and state controller. Paul Laxalt was elected governor and Wilson McGowan state controller; Harvey Dickerson remained as Attorney General. These three constituted the Highway board with the governor, of course, chairman.

And John Bawden was appointed state Highway engineer; Ralph Ottini, deputy Highway engineer, in charge of most of the office work. And Paul Robbins was brought in as deputy Highway engineer to replace George Griffith who had become quite ill and actually passed away, I believe, sometime in 1966. And later on Paul retired, and Grant Bastian was given that job.

Now, daring this biennium of 1966 and 1967 the heavy work in the Highway Department was continued. A comparison of the work [done] in the years 1965 through, say, 1968 as against work which had been done back in the early forties or late thirties is really—it's almost incomparable. Where we could use, in two-mile highway with two lanes, we might use only three thousand cubic yards of aggregates. When we started building the Interstate, these wide four-way lanes, we would need—without counting aggregates used in the bridge, we might need as much as two million yards for the same mileage. And this made differences in the type of machinery supervision, type of testing, many things.

I thought I would make some remarks about the construction department. The testing department and the construction department must always work very closely together. So much of the construction testing has to be done in the field, on the job, at the time the material is put on. It took too much time to send the samples into the laboratory and wait for a return before you could continue. So there's continuous testing going. One of the things which had been done, the Highway Department shops had taken, what we might call, mobiletype trailers, something like mobile homes, and we had fitted those out with sufficient testing material to do the routine tests, such as sieve analyses and liquid limit, plastic limit (that is, the Atterburg limit tests), and some of the other tests which

could be done rapidly, and controlled on the field. And testers were trained to do this, continuously being trained.

Another thing which had changed was the size of the hauling vehicles. If you should look in the supplement to the 1965-66 biennial report, you will see a picture of a train consisting of three large vehicles and an engine to carry them, hauling gravel. The caption under that picture is "Millions of tons of dirt and gravel were moved to build 270 miles of roadway." That's in this 1965-66 biennium. And this particular gravel train with those three vehicles carried 135 tons per trip.

Compaction was a very important thing. We had to do compaction tests on the job, of course, but the compaction apparatus consisted of huge sheep's-foot rollers and some flatwheel rollers. And some of these projects made use of fifty-ton compactors. And it was necessary to speed everything up; concrete mixers were used, transit mixers, where we were building large structures or in the—. This was the beginning of Portland cement concrete pavements, We'd used asphalt pavements instead of concrete for many years, since the early 1920s, because of its cheapness. But when we were building these freeways, we had to go to concrete because it's got really a better structural section. And we had to use the modern pavers, and everything had to be speeded up.

Some of the major projects during that biennium 1965-66 were indeed expensive. The largest one, [to] date cost \$6,089,522 to build nine and a half miles on Interstate 80 in Elko County between Wells and Elko. Then there were many other jobs which cost more than a million. Much of the work in southern Nevada could be continued year round, practically all of it. The northern part of the state, however, we usually had to shut those

jobs down during the winter season because once the ground materials were frozen they could not be well compacted. Another item, during this period, was the beginning of tests throughout the country using nuclear instruments. I'll tell a little more about that.

But the construction department as well as the testing department and design department all contribute some in writing specifications. And during this period of 1965-66 Stanley Doty, who was the chief specification writer with help from the construction and testing department[s], put out a new set of instructions in the construction manual and also a new concrete inspectors manual. The road building of this period, '65 and '66, was probably at its greatest point in the years that I worked in the Highway Department. For example, twenty full-time field survey crews were required. And of course, during the peak summer activity, additional help had to be secured.

Another item which the testing department seemed to get involved with particularly— [that is] I personally became involved with— [was] landscaping and beautification. [In] the early days the Highway Department did not have the money, the time, or the personnel to do much about beautification. We did hire a man by the name of Brown— "Brownie" we called him (I can't remember his first name)—back in the thirties to do some tree planting. And we planted Chinese elms along the highway around Lovelock; we also planted a few out in Washoe Valley, most of which succumbed, and a few others here and there. We dropped the idea. Some of the district engineers were very reluctant to "waste money," as they stated, on trying to beautify our highways when we didn't have enough money to get the roads in a travelable condition. There was some sense to that. However, as money became

more plentiful and as the Bureau of Public Roads became more insistent that we do what we could, we did finally agree to put in the landscape department. However, before that time there were a few places which were fixed up by some of the district engineers. Denton Hayes, who was the district engineer in Tonopah for quite a few years before he was brought into the Highway Department as one of the chiefs, fixed up a nice little parking area on U.S. 395 about twenty miles north of Tonopah. There was a spring there, and he planted a few trees and put out some benches. And people did enjoy that. What he had done was called to the attention of others, and I think the district engineers began to realize that something had to be done.

I did one thing during the years of the war which was a courtesy of the state Highway Department. The city of Elko wanted to improve a parking area. I didn't have too much going on in the winter months, so I drew up a landscape plan for the park area, in rough. I was not a draftsman, so I turned my rough design over to the design department, and they fixed it up in good style and sent it on to Elko. They followed this fairly well but there were some things they didn't like, so they made some changes.

There were minor amounts of landscaping done down around Indian Springs and Cactus Springs, in southern Nevada. There were cactus plantings and some other plantings. We also secured some hawthorns. During Mr. Allen's administration hawthorns were planted on King Street and some others were planted on South Stewart Street along in front of what was then the Highway shops. Those South Stewart Street trees were all removed when U.S. 50 was improved. The hawthorns along King Street still remain; some others which were planted on the north side of town were taken out. A few years later however,

after we had a landscape department, quite a number of things were done.

I was on the board to examine landscape engineers and remained on that particular board until I retired. The first landscape engineer was a woman, Mrs. Winningham, and she held this position for quite a number of years. Mrs. Winningham was [later] retained as a draftsman, a job which she kept until sometime after her first husband died. She then remarried and I believe went south. By the way, one of her daughters worked summers in the laboratory.

I think I should mention at this time the relationship between the Bureau of Public Roads and the testing division of the state Highway Department. The largest portion of the Highway funds, of course, used for road building in the state of Nevada, is furnished by the federal government. Actually ninety-five percent of the funds for freeway construction came from the federal appropriation; the state put up only five percent for the actual construction. I believe for primary and secondary roads the percent was something like eighty-three to eighty-five as against around fifteen percent put up by the state. The Bureau of Public Roads therefore had considerable to say about where the roads were built, the planning, the specifications, and the construction.

In the early days, in the thirties, Mr. Sweetser, who was head of the western division [had] his office in San Francisco. He visited Nevada on rare occasions. But Mr. E. C. Brown was a full-time man who inspected and conferred with the engineers of both California and Nevada. There was no resident Bureau of Public Roads man at the time. The first resident engineer, that is, who resided in Nevada and had Nevada as his territory, was William H. Smith. Bill Smith, as we called him, had come to Nevada, I believe, in the

early thirties and was assigned as a Bureau of Public Roads resident engineer on the forest roads, particularly the road from Spooner Summit down around the north part of the Lake towards, what is now, Incline, State Route 28. Bill was resident engineer there. He later took other jobs but was finally assigned as chief bureau engineer for the state of Nevada. And he was given an assistant, Forest Hall, and later there were several other assistants. I believe George Kreitser came in later on. Bill's first office was a quonset hut put up on the lawn of the Heroes Memorial Building in Carson City, which houses in the basement and first floor the state Highway Department, and the top floor, the state engineer. And he worked there until the Highway Department was moved to the location at South Fall Street, southeast of the capitol building. The Bureau of Public Roads was then housed for a time in the same building as the state Highway Department.

Later on, I believe, Forest Hall then took the place— I've forgotten the year, but he took the place of William H. Smith when Bill retired. And Forest was the chief engineer until he retired. The next chief of the bureau, as far as Nevada was concerned, was H. L. Anderson; and John Stanton— and I believe Kreitser was already working for him at the time, George Kreitser, and John Stanton, Jerry Purdy and Forest Norton and Don Graf. Now John Stanton was Anderson's assistant. Kreitser attended to quite a few field operations and Forest Norton also did quite a lot of the field operations. I don't recall just [what] Jerry Purdy and Don Graf [did]. I think they were working in both the field and in the office.

To describe what our relations were with the Bureau of Public Roads, we started out at the time the roads were contemplated, making a material survey, developing gravel deposits

for use in concrete and use in roadbed aggregates and sand and other materials. And those tests' reports were added together and diagrams made of the test holes, and all that information was distributed to the following people: Bureau of Public Roads; to the design department; to the division engineer, in the particular division where the road is being built; and a copy was saved, of course, for the future resident engineer. The Bureau of Public Roads would approve—I don't recall that they ever disapproved anything we recommended, but they had the privilege of reviewing those tests. Other states started doing this, but I believe Nevada was the pioneer in it. We saved many thousands of dollars by showing the contractors exactly where they could get materials, and showing the testing materials and the royalties, if there were any royalty, or if there were no royalty, if they were on government land.

Then when a job was let, a contract was let, of course the bureau had control over a lot of other things: planning department, and the construction department, and the design and all of that. But to describe the testing department's relationship with the bureau, I must go into a little more detail. Every test that was made on every item that went into federal aid construction, every test report had to be submitted to the Bureau of Public Roads, the failing tests as well as the passing tests. And, of course, whenever there were tests which failed, corrections had to be made and the Bureau of Public Roads would receive the corrections that were made. Before the contract was let, the testing engineer would make up a memorandum with recommendations on the roadbed design based on soil tests. And the testing engineer's recommendations for roadbed design based on the soil test—those had to be submitted to the bureau and approved. I don't recall

that we had very many failures or many turndowns. As a matter of fact, we helped the bureau on their own Forest Service roads, get together some of the same data, and made recommendations. Chemical tests, as well as physical tests, all tests that had anything to do with the spending of federal money to build highways, had to be shown to the bureau. I believe as time went on, they had to have more than one copy, because one copy was retained in Carson City and another one sent on down to the division office in San Francisco.

We had good personal relations with many of the bureau people. We went with them on projects under construction. Of course, the design people went out with the bureau people also and went over the jobs when jobs were being designed. And the division engineers would also go out with them. I recall many trips taken with bureau people where there was material trouble or where a new idea was presented. We have mentioned this idea of record samples, where the bureau insisted upon samples taken after the construction had been completed, or each individual layer had been completed, and brought in and tested to see how nearly they conformed with specifications that were described by me previously. But a man by the name of Forest Norton who worked with the bureau went with me, when this idea was first brought out to pioneer how we were going to do this. And I recall one humorous instance on a job built by Dodge Construction in Churchill County east of Fallon when we had to relocate U.S. 50 on account of the Naval Air Station being built.

Well, Forest and I went along the road, and here and there we would take a sample, and we were deciding on just how often we should take samples and how we should do it. I recall about the first time we put a hoe down, we got into the base course, which

had a specification of one and a half inch maximum size, and I dug out a boulder about five inches in diameter right in the base. I was embarrassed. Forest laughed and he said, "Well, we'll call it accidental." Actually it wouldn't have happened once in a million times. How that one boulder got up into that base course, I will never know. But there it was, in the very first sample we took [chuckling].

At a later time, I want to talk about some of these people who held various jobs in the Highway Department and a good many of those who worked in the testing department over the years, but for the time being, I will confine my remarks to more or less generalities. However, I will show what happened to Highway testing personnel in the headquarters laboratory during the past few years, that is 1965 to '68. The personnel increased from 1965, forty-three, to '66, forty-seven; there were still forty-seven, but in 1968 they had fifty-three. The biennium report 1967-68 was written after I had retired. However, I am going to mention here the tests made by the different portions of the laboratory, and I'm going to describe for each of the six sections the number of kinds of material and the number of samples of all these kinds and the number of tests. Very seldom one test is given on one sample. Sometimes one sample might have as many as ten or twelve more tests. I had tabulated these. The chemical and metallurgical lab had twenty-nine kinds of materials, 2,790 samples, and a total number of 12,664 tests. The roadbed aggregate section which tested mostly the gravels and soils used in base course and surface courses tested nineteen varieties of materials with 1,928 samples and, believe it or not, 35,169 tests. [The] structural materials section, where the concrete and steels [were] tested and related materials had

twenty-one varieties of material and 7,768 samples with 16,027 tests. The great number of samples there had to do with the concrete cylinders which came into break and with reinforcing samples. You might get as many as 150 concrete cylinders from one particular job; there may be as many as sixty or seventy pieces of reinforcing steel.

Now in soils and foundation materials section, which was newly established in 1965-66, there were sixteen varieties of materials, 7,988 samples, with 21,465 tests. This section also made eleven special reports [which] particularly [required] quite a bit of research and thirty preliminary roadbed designs—that is, from the foundation materials tests, soils and so forth. Roadbed designs were recommended—so much base and so much plant mixer, for so much Portland cement concrete, and there were thirty of those made during this biennium.

Then the bituminous mix design section, which did tests such as stabilometer tests to check structural quality of aggregates mixed with asphaltic materials. This particular section had eight varieties of material, 419 samples, and 6,521 tests. Now this section, while it seemingly did not have as many samples, or do as many tests, had as many employees as some of the other tests and maybe more. But the type of tests done there required considerable amount of time, where samples have to be mixed, prepared, cured, and perhaps kept at a certain temperature for a certain time and then tested. And the asphalt section, where the liquid and solid asphalts were tested, shows only four kinds of materials, general classifications, but with 7,335 samples and 88,419 tests. That number of tests—I think, they must have counted the number of penetrations made in each sample with a penetration needle. You usually put like four penetrations, and take the average.

They certainly must have done that to get 88,000 penetrations. In the penetrations, the tests alone, by the way, there were 56,485, so I considered they must have done that on each sample, counted the number of penetration tests. This by the way, was made up after I had left the Highway Department [laughs]. Now in totaling all that out, that means they had worked on ninetythree different varieties of material; there were 28,228 samples and 180,265 tests.

Now the Las Vegas laboratory was established to do quite a few of the tests that could not be done routinely in the little labs on each job. But things like testing the concrete and some of the surfacing gravels and things like that [there] were six kinds of materials tested down there with 1,848 tests. Now, there was one man federally employed, but sometimes he had one or two helpers.

I think I should mention one thing that needs attention. The entire Highway Department, as it grew, worked under quite a number of new concepts. And I think I should mention those, although it's explained in some of the biennial reports. Whoever wrote this particular part up, started out by saying, "The space age technology is finding its way into our highway planning and construction." And they go on to say how roads could be located and even designed by using only aerial photography and computers without a man on the job. That is a little bit farfetched as a statement, because you always have to go over the ground and survey it before it can be contracted. But the design can be pretty well made up by aerial photography and computers. And then the maps and plans can even be drawn and printed electronically; that is, many of them can. Then the field survey crews can even use laser beams and other electronic devices. And in the field testing, on the job testing, nuclear testing

has come into being, and at the present time it is used extensively throughout the world in testing compaction, relative compaction, moisture, and sometimes asphalt content where applicable.

Now the Highway administrators can get almost instantaneous information on current finances and progress and status of the personnel, and a good many vital aspects of the program. Then, too, communication has improved by the use of radio so that it can be almost instant between a resident engineer located a hundred miles from his district office or perhaps three hundred miles from the Carson office. People traveling with radios in their cars have constant means of communication. This has been pretty well established by placing monitors on mountain tops and so forth throughout the state.

The testing department now functioning in its own separate building was perhaps able to function better than it ever had before. It was able to accommodate more people and more equipment. Yet it could keep the same coordination with other divisions, that it has always kept, with the Bureau of Public Roads, design, with bridge and the right-of-way departments and the outside agencies. Quite a lot of work has always been done by the testing department until commercial laboratories were established in the state for outside agencies. School districts would send us samples of materials they wish to build [with], would ask us to make a foundation study for a school building, or it might be for a courthouse, or it might be for a road some county was building. We did a lot of that work before commercial testers were in vogue. We also tested for the government, the Naval Ammunition Depot and the Naval Air Base at Fallon. And we actually prospected for materials and actually built several emergency landing fields for the government during

the war money for which. was outside the regular Highway funds.

Now the final record sampling program was intensified to the point where they had to have four full-time men to cover it. That was especially during the summertime when construction increased. It also was decided that one man should be put in charge of delineation of sketches of material deposits and the determination of the amounts of material in there and the arrangement which goes into special provisions. Robert Widaman, a former mining engineer was placed in charge of this department. Additional help is required to do some of the new tests which had come into being, tests which relate to new types of construction. Treating borderline or base courses which ordinarily would be unsatisfactory by special means, such as Portland cement (cement-treated base we call it), meant more tests and more people testing.

I might mention here that Budd Rude, our chemist, had developed a method for determining the cement content and cement-treated base, which is rather difficult because, of course, all Portland cements contain lime and some of your soils contain lime, some of [the] bad ones. And to determine the amount of cement in there, in order to check tests or record samples, it's quite a little study in chemistry. And that method being developed and the American Society for Testing Materials having considered adopting it nationally, that's a feather in the cap of Budd Rude. We were lucky to have a man like Budd.

Quite a number of new pieces of equipment were placed during this 1967-68 biennium. The asphalt lab put in new testing instruments, and the bituminous mix design section had to enlarge its staff and add more equipment—ovens and equipment to determine strength and check on additives.

And the soils and foundation section was fully equipped with tests to determine direct shear and triaxial shear, and tests to evaluate aggregates with respect to their resistance, to wear from traffic, and deterioration from wetting and drying and oxidation. And a test known as a degradation test, has been developed and [is] being used, in particular during this biennium.

And some research has been done during this biennium for trying to develop a more rapid method for determining roadbed densities, doing this by study of various nuclear instruments. Much of this work has been done by other states and by the Bureau of Public Roads. Nevada is doing their pioneering at this time. The chemical section has been modernized to the point where they can do many, many tests very rapidly with only two or, at the most, three people working in the laboratory and direct methods of testing. Certain new equipment has been added, such as the Leco Carbon and Sulfur Determinator for determining analyses of steels and alloys. That instrument was placed in a laboratory. And a good many other pieces of equipment, including microscopic equipment and other equipment, has been added from time to time in this section. And the section, during the early 1968 period was designated as a crime laboratory for assisting identification of drugs and poisonous materials. And this was done more or less as an assistance to state and local law enforcement agencies.

Several college-trained engineers were added during the biennium in assisting and formulating research programs on skid resistance and, of course, nuclear devices. And it finally became apparent that a better compression and tension testing machine was required. And that would mean an addition to a laboratory, which was okayed and later on, I believe about 1970-71, was finished. The

new laboratory had to have a higher ceiling in order to put in a much larger testing machine.

During this biennium the Contract Claims Review Board was increased to six regular members. We started out with four members, plus a chairman, represented by the construction engineer, the testing engineer, internal audit, and legal department. During this biennium the assistant division engineer from District Two was added, who would represent six districts, and the assistant bridge engineer was (added). This pretty much took in all the departments who would have anything to do with claims.

I've already made some mention of people connected with the beautification program. But I omitted some of the important features. I recall that in particular President Johnson, but I believe more particularly, Lady Bird Johnson was very much interested in ecology and cleaning up things in the nation. On October 22, 1965, President Johnson signed the Beautification Act. I mention that the promulgation of this thing is no doubt due to Lady Bird's interest. But Congress passed the bill and Johnson signed it. It had three principal sections: first, control of outdoor advertising; and second, the control of junk yards; and third, landscaping. I previously mentioned [a] few things about highway landscaping and personnel. Joan Winningham was, of course, the first person to be placed in charge of the landscape program, but held the spot only four months and was replaced by Jack King. Miss Winningham, "Joanie" we called her, was kept on as an assistant and she did quite a little bit of drafting. Prescott Wilson, who, by the way, was a former high school student of mine, graduated from some college in California with a major in horticulture. And he was on the landscaping staff for a while. And in addition to Jack King there was, of course, Randy Dick, who was pretty much a

field Juan; Jac Shaw, a landscape architect; and F. Bill Bowman, assistant to King.

We've had several landscape contracts in the past several years, but the biggest one occurred just this last year [1973]. And that was the landscaping of several of the structures on [the] Interstate system and on freeway systems in the RenoSparks area. A collective bunch of structures were—design was made for landscaping those. And the total cost of that by bid was \$427,000, which is quite a sum for something like that in Nevada. And Angelo Pecorilla, from Minden, was the contractor,

The landscaping personnel has increased to a total of ten people, I am told, at the present time, 1973. Thus far (that is, in 1973), not too much has been done with Sections One and Two under the Johnson program. However, some of the junk yards, at least, have been fenced but certainly have not been hidden; they're still there and as unsightly as ever, in a good many cases. The control of advertising signs along the highways has been controlled to some extent, especially on the interstate system, but much remains to be done along the primary, secondary, and so-called scenic roads. Some of the scenic roads have more junk and more advertising showing than the Interstate system.

I might mention something about the last out-of-state trip I took, before I retired. But before I mention that, I believe the law states that when a person who has reached sixty-five he's more or less obliged to retire. I was kept on until I was sixty-seven. But according to the law, also you must make an official request each six months if you desire to stay on. I did this four times and was kept on until January 1, 1968.

Now to go on about the last out-of-state trip I took. Keith. Layton, who had been appointed, I believe, in 1967 as an assistant

deputy Highway engineer in the construction division—he was over the construction engineers and over testing engineers and many others, regardless of the fact that the testing had as much to do with design and some of the others, but that is the way it was worked out. And I always had good relations with Keith. We worked together very well; I helped him out of some difficulties when he was a resident engineer struggling along. And he made it a point to request that I attend this construction meeting, that is, a meeting of construction engineers, in Denver. I believe that was held in March of 1967. The meeting was not exactly a formal one; it had more to do with informal discussion of problems common to all highway construction in the western states. And representatives were there from quite a number of the western states.

It was my first meeting with James Desmond, who later became the chief of material testing engineer in my place [in] the state of Nevada. I recall that we had a little time on our hands after the meeting, and it seems the distance from the place we were staying in the motel and the downtown area was very great. We rode down and decided to walk back. And while we were downtown looking around, we went through the Colorado State Museum. And I'll say this much, I think Nevada has a sharper and better looking one—that is, at that time. And we started this long walk. I don't know how many miles we walked before we got tired and finally hailed a taxi to finish it, but we did walk through quite a bit of the city and some of the suburbs.

In the 1967-68 biennium there were, of course, quite a number of people who received service awards which they do every two years. I think I will mention those people, especially those who were in the service thirty years or more. And I'm going to give

some remarks about some of those people as I go along. Many of those contributed highly to highway construction and highway maintenance, upkeep, and going through a lot of real tough times in stormy weather and in fair weather, as well. In 1966 (I'm going back a ways here) there was Jim Armstrong's name as a forty-five-year award winner. That was a long, long time. I have known Jim Armstrong for many years. He was chief of maintenance in District Two which embraced most of northwestern Nevada and some of the central part of the state before a district was formed at Winnemucca. And Jim was in charge of much of the maintenance and some of the construction done by maintenance crews for many, many years. He was noted in particular for one thing; he loved "d.g."—decomposed granite. And decomposed granite happened to be plentiful around the Carson City-Gardnerville area, and we used much of it in using secondary roads. Jim did a very thorough job of mixing that and compacting it, and the roads he built—secondary roads, many of them, little country roads, for which we did not have federal money—he built those and did a very good job. He also acted in some cases as a supervisor in some of the construction, as an assistant to the resident engineers.

I recall one thing about Jim, which I may have mentioned a long time ago. He had an old car (I forgot the make of it now; it seems to me it was a Studebaker), and he took care of that car like a baby. And when we were out in the field together—I recall one time being in California, he was to make sure we obtained a place to sleep not more than a block away from where that car was placed. Jim retired after forty-five or forty-six years of service.

Another man whom I've known for many [years] came up through the ranks. He received in 1966, a forty-year award;

that's Dale V. Rose. I don't recall about Dale's education, but I know he started from scratch in the field and came up through the ranks to become resident engineer. He was stationed at Carson City for quite a time. Then he became district engineer at Winnemucca, and served there until his retirement. Dale was active in community work wherever he lived, and he had done quite a lot around Winnemucca. In fact, Dale was an active Mason and he went through quite a lot of the Masonry and through the Shrine.

Now in 1966 there was another man—in fact there were several of them—whom I've known for years. I'm going to start with Charlie [Charles J.] Brown. Charlie Brown also came up through the ranks the hard way and was a resident engineer for some time. Then I believe he left the department for a short time during the war and then came back into it again. Charlie was resident engineer on many jobs throughout the state and finally was appointed district engineer in Tonopah. He then retired and lived with his wife in the Carson City area. However, just lately, in fact, I believe it was March 18, this year, 1973, Charlie passed away.

Another man whom I've known for a long time and who has done a lot for the state is Victor W. Clyde. Victor was born in Carson City, the son of E. W. Clyde who was at one time, editor of the *Carson Appeal*. Vic went to school, to me, I believe, all four of his years in high school, or at least three of them, and had his math, science, and chemistry, under my direction. He is one of my students who never missed a single problem in algebra or geometry. There was another, a girl, the Springmeyer girl, Adele Springmeyer, who performed tin] an identical manner. She never missed a problem.

Vic went to school in Carson; I don't remember whether or not he went to the

University, but I believe he did for a short time. And he came up through the ranks in the field; most of them in the field work would start out perhaps as a chainman, then would be advanced to a rodman, then instrument man, maybe an assistant resident engineer, and finally a resident engineer. Vic went through all of those stages and like most resident engineers he was subject to all the trials and tribulations. Those people deserve a lot of credit, because they have everybody looking over their shoulders from the contractor to the Bureau of Public Roads, including the district engineer also in his particular district where his job is, and numerous people out of headquarters—for instance the construction engineer, design engineer, perhaps the testing engineer. I remember finding Vic at work very late hours; many of the other resident engineers did the same. In the early days we did not have much help. In later years when construction became so great, and any particular job was a real expensive job, it was necessary that the resident engineer have plenty of assistance. Sometimes he had an assistant resident engineer, and he always had an office man or two. Plus he always had, right from the first, a field crew to put in the slope stakes, grade stakes, and check on the surveying, and in later years some of them had as many as two field crews on the big Interstate jobs. But I recall the old-time resident engineers in particular, as Vic and Browning and Denton Hayes and some of the others, worked many hours overtime without any compensation. It seemed in those days none of us thought about compensation for overtime. We knew nothing about it, didn't expect it, probably wouldn't have taken it if it were offered to us. Vic Clyde handled some of the very large jobs, and he was finally made construction engineer and brought into Carson City. And he knew he was about to

retire in just a few years, and a construction engineer had a rather rigorous job and the chief maintenance engineer received about the same pay, I think, the same pay as the chief construction engineer. Vic made a request to switch over so he might have it just a little bit easier for his last years with the department. And he retired, I believe, just—well I know it was 1971, early 1971, because he worked with me up at the Lake [Lake Tahoe] in that year. I believe that's the year Vic retired.

Now, there's Denton Hayes. Denton Hayes, I believe, is a native Nevadan, and I believe he went through the Reno schools. He was a basketball sharp in Reno High. He may have gone to college. I had not been able to contact him lately in order to find out. He is now retired. Denton, like the others, came up the hard way, and was a resident engineer for a number of years, and was later appointed to district engineer at Tonopah, at which time he performed admirably in the district. He was one of the few that believed in doing a little landscaping and making a few roadside rests for tourists long before a definite landscape program had come into being. Denton made a nice rest area about twenty miles north of Tonopah where there were a few springs. I remember he did a few other things. He made a few plantings there, but in such areas there's very little rainfall; it's very difficult to get things to grow unless there is a supply of water right in that particular spot.

Denton later was brought into headquarters as administrative engineer. Under the administrative engineer there are quite a number of subdivisions. He had charge of financial management, accounting, data processing, public information, office services, and had charge of the person who was secretary to the Highway board, in charge of personnel and training, and systems method analysis, and *Nevada Highways and*

Parks magazine, and the PERT program, as it was called; program control planning. Having these operations under one man relieved the other chief assistant Highway engineers of those duties and allowed the one of them to spend his time with the design areas and the other with the field operations areas. Denton retired, I believe, just about a year ago.

In 1968 there were, of course, a number of people who had long years of service. One we have already mentioned is Reuben E. Eldredge. He was recipient of a forty-year award in 1968, although he was not working in the Highway Department at the time the award was made. I do not have too much on the background of Reuben. I do not believe he was a college man, or if he were, he didn't stay there very long. He came up through the ranks like the others, starting as a rodman probably or even chainman and surveyor and resident engineer. He was by nature a feisty little fellow. He'd let somebody know in a very emphatic manner if he were displeased with the manner in which he was operating. But he advanced; he was brilliant, through the years he had been a resident engineer on many tough projects.

I recall one trouble spot we had in Reno after Reuben had graduated, we'll say, from the resident engineer's job. And I recall how he worked to overcome that problem that had to do with the coverings over the concrete in a structure put over one of the highways in Reno going under the railroad track. And that covering had to waterproof the concrete, had to bind the paving to the structure, and had to be nonskid—all of those things taken together. And I was of some help, I think, at the same time; between us we managed to solve the problem.

But Reuben [was] quite a good man, good Highway engineer. He got himself into trouble in the later years partly probably because of his sharpness. He did not take time to think

about what he may say; that is, he did not think in advance about it. But he was a good engineer and he advanced to assistant district engineer in Elko and then was transferred into the Carson office as construction engineer, or assistant construction engineer. And during Otis Wright's administration [he] was made assistant Highway engineer, now called deputy Highway engineer, in charge of the field operations.

Reuben was in the service during World War II for a short time. I do not know the facts, but the scuttlebutt was that his outspokenness put him in bad with some top sergeant, and he was busted, so they say. He was busted in rank. That, very likely, was the way it happened. Reuben, after leaving the Highway Department, I believe, went to work for a contractor for a while in Reno, and to the best of my knowledge he is still at work, probably for contractors in the Las Vegas area.

Another man with thirty-five years of service was William H. Gibson, Bill Gibson we [called] him. He, too, had come up through the ranks, as a resident engineer for parttime. But he was mainly on location. A very important thing. He was working under Paul Rawls who was a chief location engineer for quite a number of years. And Bill Gibson finally became the chief location engineer. Bill was noted for his work on the Clear Creek grade—that is, the new one. The curves there are not perfect circles; I believe they are hyperbolic, to some extent. Bill located that highway and received many compliments for it. It was a very difficult job when the grade had to be kept within a certain limits; curvature had to have radii of a certain length, in order to satisfy traffic with the speeds that were reasonable. Fifty miles per hour has been set there, but many of the drivers are able nowadays to take those curves at seventy, regardless of the fifty miles per hour signing. All of that and the immense fills which are required

were more or less, not exactly designed, but located, we'll say—the designers had to do the job of figuring out the quantities. But Bill Gibson did a nice piece of work on that, as well as a good many other jobs.

When that particular job was built, of course, to design— introduced another very important feature. Those who have gone over the Clear Creek grade will notice that where the cuts are deep, it has been terraced. And that is a very important thing. That way a boulder three hundred feet up at the top of the hill is not likely, that it will roll clear down onto the highway. One of the top terraces will catch it and so forth, so that the last terrace or the terrace nearest the highway will be maybe only ten to fifteen feet vertically above the highway. There may be several of those on some cuts. That has been a very important thing; [when] they are made, each flat area in those terraces must be wide enough to hold all the debris at the natural angle of repose above it.

Again I believe the location for Clear Creek was an outstanding one, and Bill Gibson certainly deserves credit for that. Bill continued as location engineer for a number of years. His home is in Carson City. Mrs. Gibson was a teacher who taught along with my wife, Mrs. Little. He had two daughters. His oldest daughter Theresa, played alongside me in the Carson City band. We were very friendly with the Gibsons. Mrs. Gibson was the first to pass away. Bill remarried but shortly after that, just a few months, he passed away. I don't remember the year.

Now, we come to another thirty-five-year man, in 1968— was Stanley Sundeen. Stanley was born in Reno, and he had all his schooling in Reno: grade school, high school and University, including four years in electrical engineering. And he came to the Highway Department in 1931. He had three

years of experience out in the field, surveying. Then he was brought into the headquarters office and made an assistant draftsman in the right-of-way department. Following that, he was made chief draftsman in the general drafting room in the state Highway Department. And again after that [he] was made office engineer. And he served two years in the service in Europe in World War II, in the field artillery. He returned from the service, with the Highway Department as office engineer and secretary to the Highway board. At present his title is administrative service officer. He's still secretary to the board.

Stanley has been active in community affairs. He was one of the founders of the local 20-30 Club, and he is a past president of that organization. He has done a considerable amount of work in Masonry. He's a past master of Carson Lodge Number One. He has gone through, I believe, all of the York and Scottish rites; he is a Shriner. And, best of all, he is past grand master of Masons in Nevada.

Stan and I worked together shortly after Pearl Harbor on a study in which several of us were involved. This study had to do with condition of roads, availability of food and water on the east slope of the Sierra from the California border this side of Bishop, north to perhaps the Susanville area. Stan and I had the southernmost section; others had the other section. we made these studies and recorded available facilities. At that time it was believed that possibly the Japanese would land on the coast after Pearl Harbor, and California refugees would be coming in here. Fortunately, they did not, because facilities were certainly too meager to support more than five or six hundred refugees at the most in the section Stan and I looked over.

Stan has not yet retired. Although he has the time in. He is at this time, 1973, still

working in the state Highway Department, but I believe he intends to retire in a short time.

In the 1966 thirty-year group, there are quite a number of people who deserve some credit. George M. Baxter, was one of those. George, I believe, went into the Highway Department shortly after high school, except for a few years prior to World War II. George was a student of mine. He had all of his schooling in Carson City. For a time, when Woodgate and Meginness and I had the old Athens mine west of Carson, George and my father-in-law, Mr. Fairley, were paid five dollars a day for doing some mining for us. But after that George went into the Highway Department (he may have been there before), and he worked in the drafting section until his retirement.

Joe Boniface is another man who deserves a lot of credit. Joe was not a college man. I believe he was born in Carson City; I'm quite sure he was. His mother operated a rooming house in the east side of Carson City. So I'm quite sure that Joe had all his schooling here, and was out of school at the time I came to Carson City in 1924. His sister, Lillian, also was raised here in Carson. (And by the way, Lillian was an office girl in Reno in the district office for a number of years.) But to go back to Joe, he got into the Highway Department as a carpenter, I believe, and he helped build a good many maintenance buildings particularly in this area. And he was very familiar with building materials, and would inspect much of the building of maintenance houses, maintenance sheds, storage buildings, and was also familiar with maintenance of these buildings and repair work to those as well as repair work on some of the highways. Joe was the chief inspector of the present Highway building on Stewart Street at the time it was being built. Later he

was made chief of operations of the building; that is, he was head of the janitorial services and also had something to do with the Motor Vehicle section. I believe Joe has retired but I am not certain about that.

Another man who received a thirty-year reward in 1966 was Lee F. Cochran. I'm not too familiar with Lee's training but I believe he had some college training. He was in the diplomatic service for some time, and I believe that was in South America. To the best of my knowledge, Lee was a linguist and did well in the diplomatic service, but he and his wife later gave that up. He moved into Nevada and lived at Genoa for a while. He raised a family of—I believe they were mostly girls, but I know there was at least one boy, maybe there were two. Lee was in the drafting department of the Highway for a good many years. And at the present time, I believe he has retired. He lost some sight in both eyes through [an] operation, but was able to see by the use of contact lens. He was very well versed in a good many subjects and could interest a person who would take the time to converse with him, on a good many subjects.

Another man who had done a lot for the Highway Department is Stanley P. Doty. I'm sure Stanley is a native Nevadan. I believe he was raised in southern Nevada. I'm not too sure about his schooling. I'm sure he had some engineering work; [he] may have had a degree.

Some of these people I have contacted; others I have not contacted thoroughly. But I do know this about Stanley, he was a conscientious resident engineer. My first meeting with him was at Elko. At the time he was resident engineer on the section of the road built but toward Lamoille from Elko, and that was right after the war when it was difficult to get materials. I went up there to

assist with the checking of concrete for air entrainment. Air entrainment was a thing which had just come into being. It was noted that—accidentally, as a matter of fact, and I had described this previously— that if air could be entrained in the Portland cement, it was less vulnerable to deterioration from weathering. Therefore, the state had to put that into their specifications, and the way of measuring the air entrainment in the finished concrete was at first a difficult thing. We had an awkward volumetric measuring system. I had gone up there to show Stan and his assistants how to do that. But like I say, it was right after the war and things did not progress well then. The lumber which was used for forms of some of the concrete work was put in place, measurements taken and all okayed. Then in about ten days when it was time to pour the concrete, further measurements showed that that lumber was green; it had shrunk so the dimensions were all out of place. We could not pour concrete.

I spent some time with Stan, then, while I was waiting for new forms to be put in, helping him inspect his work. I paid particular attention to the production of gravel in a borderline deposit while a contractor was breaking in his son to run a power shovel. The boy was lucky to get the bucket loaded, let alone sort out the gravel. Someone almost had to stay in the pit and show him where to pick up every piece. I helped Stan in that respect for a while and I got acquainted with Stan's family.

We had a Sunday fishing trip together, or two. I recall that. Stan came into the Highway Department a few years after being a resident engineer. That is, he came into the headquarters of the Highway Department and became the specifications engineer, a task which he had done most thoroughly. And, I believe, at the present time he has enough

assistance so that he has a staff of about four, altogether.

The latest standard specifications are mainly the work of Stan; however, help was obtained from all other sections. The testing department, of course, was required to furnish a good many specifications for the materials. But Stan has that all assembled and in a very fine fashion, and he has done an excellent job as the chief specifications engineer.

Another man with a 1966 thirty-year service record is A. A. Howard, "Ace" Howard, as we called him. He, too, is a man who came up the hard way. I'm not too sure of Ace's education. He came from a large family. I didn't realize that until I'd gone to Las Vegas one time and Ace introduced me to at least two brothers down there, and I know he had others in other places. Ace was a good engineer. He had a particularly tough job when we built a portion of the Interstate job between Winnemucca and Battle Mountain. That was an Andy Drumm job and anybody on one of Andy's jobs was always vulnerable to quite a few unpleasant occasions.

Ace served a good many years as resident engineer on very big jobs, all kinds of jobs. And he finally was promoted to assistant district engineer in District Two, Reno, and he had charge of the maintenance in the district. He retired in the early part of 1967, and he and I and John Stanley of the Bureau of Public Roads, all three of us having retired about the same time, were made inspectors at Incline on some of the construction up there. I will explain that later. However, Ace discovered that he was allergic to bee stings, and those are really rough bees up there around the Lake area. He received two bee stings just a few days apart and the second one made him so ill that the doctor warned him to get out of there because one more bee sting might be the end of Ace. Ace finally

settled in Fallon, and the last I heard of him, he had a little ranch out there and his sheep were about ready for marketing. He was doing a little ranching.

Louis K. Koontz, was another man with thirty years of service in the Highway Department, particularly in the right-of-way department. [He] did some work of note in his right-of-way deals. I traveled around to some extent with Louis, particularly with respect to locations and ownerships of gravel and sand deposits. I recall one time when we got snowed in out at Eureka, Nevada. I think I've already described going around locally with Ace. And I think I've described one place where we went to locate a man who was married to an Indian woman. They lived in an abode, in which the chickens walked over the dinner table. The walls were papered with 1910 circus posters. That I had described previously, I am sure, but Louis and I also took a few fishing trips together when he had the opportunity to do so. Louis located a five-acre tract; he was one of the first ones to do so between Carson City and Stewart, built a home there, he's now retired and that is where he lives.

Cyril D. Miles is another thirty-year man in 1966, was principally on surveys and locations. Most of his work was done in Division One in Clark County. Cy had a brother in Carson City; he was employed by the Bureau of Public Roads. But I've known Cy for many years; while we had no direct relationship, as far as testing and locating [roads], he was present at a number of meetings I attended down south as well as those he attended in the northern part of the state. Cy is now located in Carson City and I am not just sure what his title is, but I believe he is the chief location engineer at present.

Orrin W. Walker, another man in the thirty-year section, and a former student of

mine when I was teaching in the Carson High School, worked in the Highway Department, I believe ever since he graduated from high school, and was in the drafting department. He was an excellent draftsman [and] finally became assistant chief and chief draftsman. But Orrin retired just a few years ago.

Now, Ralph Ottini is another man who is a thirty-year man, but I'm going to talk about him a little bit later. Ralph ended up at the time I retired, as deputy assistant state Highway engineer or one of two deputies. I'll tell about him later.

Now, the 1968 thirty-year people. One man was Paul J. Duby. I do not know too much about Paul's beginnings and what he has done, but I do know that he was in the planning department and one of Orvis Riel's top men. And he understood all types of surveying, not only the surveying with the ordinary instruments but all the new fangled methods of surveying including aerial surveys. And he has done some very good work in the Planning Department under Orvis Riel. I am not sure whether or not Paul has retired, but I do not believe he has.

Now, Bill C. Gardner [is] another man who worked for many years as a resident engineer. The resident engineers get all the brunt of things, and everyone who has been one successfully deserves some credit. I recall Bill's work. He was assigned on some of the secondary roads where material was very, very scarce and we had some real problems in building some of these roads around Fallon, in particular, secondary roads or so-called farm-to-market roads. But Bill was a good engineer, but I believe he retired at an early date. There are a good many other people who were not necessarily resident engineers (but sometimes they were), but some of the older division engineers and people who've been in the service a long time, but back in

the years not too long since after the Highway Department was organized.

But one person who had a thirty years—I believe thirty or thirty-five year pin, was Ernie Cross at Elko. Ernie was in charge of maintenance and some of the carpentry work, I believe, in Elko, and served very well for many years.

Julian Glock, J. A. Glock is another man with long years of service in the Highway Department. Julian and his brother were orphan's home boys, I believe. I did not know much about their beginnings, and I do not know about the education of either of the Glock boys. Julian's brother had something to do with a store at Lake Tahoe and the brothers's wife was a teacher. Julian's wife I believe was a trained nurse. Julian was one of the early resident engineers when he had hard knocks. They had harder knocks in the early days than they did in later days. On the other hand, they had more liberty to do things they saw which were to be done, and they would get it done because communications in the early days were quite meager. And phones could be used, but the radio had not been thought of in the early years, and when a job had to be continued in order to get done on time and a certain thing came up which needed a decision immediately, the resident engineers in those days were pretty much at liberty to make that decision. Of course it would be discussed later on with his superiors, who would be the district engineer or even the assistant state Highway engineer. For many years there was not an official construction engineer. The district engineer in a particular instance acted as construction engineer. Testing problems were handled pretty much by the testing department. Usually Frank Morrison would go out on those and help them with 'em. I did the same thing in many cases.

Julian was a good engineer, and he was finally made district engineer at Elko, a job which he held for some time. Shortly after one of the changes of administration, he was sent down to Ely as district engineer, and spent some time there. I believe he was sort of dissatisfied with that particular job because he had to have a special place to live. His wife was in Elko doing her nursing work; her home was in Elko. And I recall that he would come to the end of District Four, Ely, of which he was in charge; he would leave the state car there, lock it up, and get into his personal car which he had left there the following Monday morning and would drive it on to Elko for use of the weekend; then he'd trade cars again on Monday, back and forth. That got a little tiresome. Julian left the state then and to the best of my knowledge went as a professional engineer and did quite a little work in the big gold mining operation, open pit operation north of Elko.

J. L. [Leslie] Hancock was an old-time resident engineer and for many years the district engineer of District Two in Reno. Hancock started out, I believe, over at Lahontan, in the days when the Highway Department was first organized. At that time he was the operator of a power shovel, loading gravel, which was hauled to the Reno-Carson highway, which was the first Portland cement concrete highway placed in the state. Later he became one of the surveyors and worked his way on up through the usual routine, until he became resident engineer, on many of the projects (earlier ones) which were built.

I recall taking a trip with Hancock and Jim Armstrong, which I believe I described previously. When asphaltic concrete came into being, our first job was about to be let—a job on state Route 395 from Huffaker's to Washoe summit. We, three of us, were sent down to California to make a study of this. I

think I've described it quite thoroughly before. But that was when I got well acquainted with Les [Hancock] and, of course, with Jim Armstrong. Les was a very good engineer, and everyone thought very well of him, Frank Morrison in particular. He thought Les was one of the very best engineers the state could possibly have. He went from resident engineer to district engineer (I've forgotten the year), but he stayed on that job for some time. Les passed away; I don't recall the year, but he was one of the old-time Highway Department men and his work was excellent.

W. R. Parry—another old-timer. I knew him first as a resident engineer. He did a lot of his work in the eastern part of the state and was finally made district engineer at Ely, District Four, a job which he held for many years. We didn't see very much of Parry over the eastern part of the state, except possibly at an annual meeting of the engineers. Parry, also having been a resident engineer, was very familiar with all the ins and outs and troubles of highway construction. And he certainly was acquainted with the problems on maintenance. I believe he was district engineer during the airlift when the eastern part of Nevada was snowed in and the hay had to be transported out in that area to feed the cattle, transported by air; the roads were all pretty well blocked. He survived that ordeal. I'm quite sure he was the district engineer at the time.

Then another thirty- [to] thirty-five-year man who spent practically all of his years known to me as chief accountant in the state Highway Department, was Ernest C. Pohl. Ernie was a resident of Carson; I'm not sure about his background or where he was born. But he was one of the few department heads we had in the late 1920s and through the thirties and forties. Ernie passed away some years ago.

Then there comes a person who was with the Highway Department for many years and one of the best thought of— Bonnie O. Reid. Bonnie O. Reid originated back East somewhere; I've forgotten the place. But she was known all over the state. She had some official title (I've forgotten just what it was), but she was the person who made out the payrolls, saw that everybody got paid, and was head of a department in which several of the typists and stenographers worked. Bonnie was an expert at the thing, and extremely accurate and efficient. Everything had to have its place; every letter was written in a certain manner and filed in a certain place. Everybody knew Bonnie. Bonnie Reid still resides in Carson City. Her mother lived with her for many years and lived to a very ripe old age. Last time I saw Bonnie was just a few days ago when she had a birthday; I don't recall which one it was, but it was somewhere up in the eighties. And Mrs. Little and I visited her and took her a bouquet of narcissus and found she had more of them in her yard than we did in ours. Nevertheless, Bonnie did appreciate it.

And there's Herbert A. Squires of the Squires family, [a] notable family, southern Nevada, Las Vegas particularly; and Herbert, too, was one of the old-time resident engineers. He'd gone through all the ropes and was eventually appointed as assistant district engineer, assistant to Hancock in Reno, a job he retained until he succumbed several years ago.

Now, E. T. Boardman has not been mentioned by me in what I have said heretofore. But Edgar Boardman, the son of Professor Boardman at the University, I believe was a native Nevadan and had his schooling in Nevada. I'm not sure but what he did some work in some other college. But I believe for a long time he was employed back East as an engineer, and he must have come

into the Highway Department somewhere in the neighborhood of about 1933 or '34. Edgar was the chief bridge engineer for many years. And I'm sure he knew his engineering and he did a very fine job. Structures were not numerous, at least not too numerous in the days before the freeways, but Ed had to develop a program amenable to what is required in freeway design, and this he did very successfully. He was helped in the effort by his chief assistant, Allen W. O'Dell, and by others on his staff. Edgar retired after [what] must have been about thirty-five years, because he retired about the same time I did in 1967.

Boardman had to enlarge his department. I believe he must have had as many as ten people working in the bridge department, perhaps more, at the time of his retirement. And I know he had done an excellent job, he and his staff. I tried to get Ed interested in inspecting at the Lake, but when he retired, he retired; he didn't want any more work.

Now, another man who was a former student of mine was Melvin J. Fodrin. Mel had quite an active life; I believe he was born in Carson City. His father [who] we called "Pete" Fodrin, was for many years connected with the federal courts—not as a judge, but I believe, one of the clerks. Melvin Fodrin, and his sister Rose Fodrin, both attended my classes in the Carson high school. I had Rose Fodrin for four years. His younger sister was not old enough; she did not get into high school until I was working in the Highway Department. Melvin was good in math. And at one time he wanted to get into Annapolis, I believe, and I gave him special work in math to [help him] qualify for taking certain examinations. But something happened that Mel did not do that. I believe he had some college work. I'm not too sure of that. But he ended up in the Highway Department.

But I know he also did quite a little building and carpentry work and was adept in that field. But Melvin came into the Highway Department, I believe, as a draftsman and followed on through with that, until he became chief designer for the secondary road system. And he followed that through for all of his years. And he had contact, of course, with many people all over the state where secondary roads were to be built. Melvin had a good staff in his division. I had close contact always with the secondary road engineers, as well as the primary and Interstate engineers, because the laboratory set up the roadbed design based on foundations studies we had made. And it was necessary always to go over the plans with these people so that sufficient material of the right kind and of the most economic kind under the conditions, could be obtained.

We had many fine relations with Melvin Fodrin. Mel, was active in community affairs. For a while I believe he was out of the department and had a grocery store of his own, but he came right back to it. Perhaps he held that—I don't remember whether he [kept] the grocery business and stayed with the Highway Department both, but he may have done so.

He retired and immediately went to the Lake (that was in 1971) as a correlating engineer with Boise-Cascade, in which he would correlate Boise-Cascade's work with the work of the inspectors and engineers of the Incline General Improvement District. He did that job for one season and for one more season after the Boise-Cascade functions were shut down. He signed a contract with Washoe County to do the inspection of the buildings, condominiums and so forth, that were being built in the country. [He] inspected in particular sewer lines, water lines, and whatever local paving the county did. Melvin

is not working at the present time. [He] lives in Carson City. His wife is one of the clerks in the Highway Department.

Now, there's Allen W. O'Dell, who has been employed in the bridge department ever since I have known him. I believe he is a graduate in engineering (I am not certain of this, but I'm quite sure he is). He is now the chief bridge engineer. He was assistant to Ed Boardman for many, many years and now has a staff [of] at least as many people as were there when Boardman was the chief.

I had a conversation with Allen just a few days ago when I was trying to find some information relative to what I'm attempting to do now—is give a brief account of some of the history of the department as well as a more finished report on the laboratory.

And there's Jack Parvin. Jack has been known principally, the past several years, as a district engineer in Las Vegas. Southern Nevada, probably, and District One, has about as much money spent there on construction and as work done, almost, as in all of the rest of the state. Probably not quite as much, but the area is so populated that streets and highways have to be built, more of them and wider [laughs] than in other parts of the state. Jack has probably more to do in his district than does any other district engineer. Jack has two assistants in his division. He has been a candidate a time or two for state Highway engineer. He started out—I knew him first, of course, probably as an assistant resident engineer. But he too came up through the ropes; I'm not sure about his education. He may have a degree in civil engineering. Jack is active in community affairs and he gets along with people in his district very well. It's a district in which there are a lot of problems. For a time there were more problems in that particular district than any other district in

the state, due to the extremely rapid growth in the Las Vegas area. He replaced W. O. Wright as district engineer down there. Otis, of course, had the problems before he had the problems of state Highway engineering.

Now, there's Paul Robbins. Paul also came up through the department from instrument man through assistant and through resident engineer's doings, on up to district engineer's. Paul served as district engineer, I believe for a short time. Perhaps it was for several years in the Elko district. He then had retired, at least temporarily, but came back to the state (I believe that was around 1966 or and took the place of George Griffin, who retired on account of illness. And George, of course, eventually passed away.)

Paul was a very fine man. He was interested in community affairs, he was a good engineer, and did his best to build the best kind of roads that could be built with what money was available to him in his district. I recall some of his problems. One of them, I think, was beautification in the Elko district. Another, I recall, one time was a little problem along the highway leading from Elko past the airport on up north, in which there was a dog cemetery started by some of the ladies at Elko on the highway right-of-way. I don't recall what was finally done about that. But then another thing about the Elko district—whoever has had that district, there's always been a problem with materials. It probably has more contamination from active clays in the gravels than in any other area of the state. And it has always been a problem, and there has always been much to-do about it until cement treated base came into vogue. Now much of the problem can be solved. Paul's top man; he is not retired.

I must say something about M. Edgar Norton, who was noted as a fine accountant. He graduated from the University of Nevada;

he's native Nevadan, raised at Lakeview. His father was V & T section boss, I believe. Ed went through the Carson schools and graduated from the University of Nevada, I believe in accounting. He started in with the state Highway Department about the same time I started teaching school in Carson City. I've known Edgar and his wife Margaret for many years. Ed worked in the state Highway Department under Ernie Pohl in the accounting division and he was the chief assistant to Ernie. He did that for many years but was also much interested in National Guard work. [He] became one of the top officers in the local National Guard, and during the war I believe had the rank of captain and he may have gone as high as lieutenant colonel, I'm not sure. But he did spend a long time in the service, but had credit for a lot of the time he spent so that he could obtain that credit as a Highway employee. Edgar was a very good soldier, as well as a good accountant.

Orvis Riel took over in the planning survey from W. T. Holcomb after Holcomb was advanced to state Highway engineer. Holcomb surely must take a lot of the credit for establishing the different functions of the planning department. But Orvis Riel in turn deserves a tremendous amount of credit for all the work that he had done. It is not my intent to describe in much detail too many of the Highway operations, other than the laboratory, but I think the planning division does deserve some discussion, because the laboratory depended upon their information for some of its work.

Orvis was born near Winnemucca about five miles out of town, and he had all of his grade and high school education in Winnemucca. He attended the University of Nevada and he obtained a Bachelor of Science in electrical engineering in 1932. He

went into teaching work and he taught math and science in Hawthorne High School, 1935 to 1937. But prior to that time he was there for two years, 1933, '34 in the University of Nevada Extension Service.

He went to the Highway Department in September of 1937 as a draftsman in planning. When World War II came along he went into the service and was a captain in the military police from 1942 to 1946. He returned to the Highway Department and was made assistant chief in planning, 1946 to 1949 and was made chief of the planning division in 1949.

Orvis retired in 1972 after thirty-five years of service. He enlarged considerably upon the work started by W. T. Holcomb. I may not mention all of the subdivisions of this planning division but one of the things that they did, which amounted to a lot of work, was taking inventory of rural, primary, and secondary roads. The inventory consisted of life studies, and cit conditions of the roads, and there was continual reinventories due to population growth in this state and through concomitant growth of all types of services and human endeavors.

Another thing which was done was to make note of sufficiency ratings of all the existing travel ways. And they were continually changing and were supplied to various organizations in the Highway Department, [and] contributed considerably to Highway maintenance and construction needs. This information furnished the department heads, gave the heads then something definite to work on when they were figuring out their budgets. And traffic surveys were made by taking inventories, counts with traffic counters also; and these contributions were made to design, for perhaps the future fifteen to twenty years, by data which is obtained at any certain time for the amount of traffic and the conditions of the roads; that could be

extrapolated mathematically, say, fifteen to twenty years ahead. Then the design would be based upon, say, fifteen to twenty years in advance, theoretically, of course, because in projecting such work you're never sure that you're going to be exactly on the right track. The laboratory used such extrapolated data, along with the test data obtained on subgrade and material site quantities and qualities, to furnish structural design to the design division for all types—interstate, primary, and secondary highways. Of course, the greater amount of base course, and surface course, and higher types were necessary on the highly traveled roads, such as on interstate than would be on primary or secondary roads.

Cartography, that is, map making, was handled by the planning survey, to satisfy the needs of the various departments and subdepartments in the Highway Department and the public in general. Their duties also included reproduction of engineering maps, and aerial surveys were made and they were used extensively as an aid in mapping. They were used also by the design and right-of-way divisions.

To give you some kind of idea about how many people and how much work was done in this division, the number of employees between 1963 and 1968 varied from seventy-four to eighty-six, for this small state. That is quite a number.

Now, I think I should mention something about the people, the men in particular who ran the five, and eventually six, districts in Nevada as district engineers. Some of these were old-timers. I think I shall talk about some of the old-timers first. I might mention first C. C. Boyer. C. C. Boyer was a very fine engineer, but he was a victim of politics in quite a few cases. In the older days before a personnel system had been inaugurated, some of the top jobs—in fact all of them

were subject to the politics of that particular period. C. C. Boyer was first known to me when I was a high school student in Bishop, California. He was a young engineer in charge of that particular district. And he was noted in particular for rebuilding what they called the Sherwin Grade. That was done with mule teams, horse teams, scrapers and fresnos, and a few blades. He was also noted for building a concrete road from Big Pine to Lone Pine in the valley. Actually it wasn't much more than a big sidewalk, about possibly nine or ten feet wide. That was the first concrete road in Nevada.

I next heard of C. C. Boyer when I came to Nevada, and after teaching school for five years went into the state Highway Department. He had settled in Las Vegas and had married into the Squires family. I believe Squires was editor of one of the papers in Las Vegas. And Boyer was for quite a time the district engineer in Las Vegas, District One. Later, he was transferred during a change of politics to another area. He spent some time over at Ely as district engineer and eventually was transferred into Carson City where he was made—he was still called a district engineer but his duties were various. He was an experienced engineer and his services were valuable in headquarters. I don't recall just what finally happened to C. C. Boyer, but I believe he left the state before [the] retirement system was in vogue.

Another old-timer was J. M. Murphy. He took over [as] division engineer at District One, I believe during the administration of Robert Allen, or he may have been there just prior to that time. J. M. Murphy was an ex-resident engineer who'd come up through the field jobs from one thing to another. I'm not certain of his place of birth or his education, nor his experiences. But one thing he did do, he used quite a lot of the money

allotted to his district to build several very fine and well-equipped buildings, an office building and a shop, repair shop, and finally a laboratory—or rather a building which was converted into a laboratory later on. He was in trouble in some respects for doing this, but everybody eventually agreed that it was the thing to do.

I recall one of the buildings was used as a temporary quarters for Highway engineers who [were] visiting in Las Vegas who had duties to do down there. We could stay there for, I believe, it was a dollar a night, instead of paying for a hotel room. And whatever money was made from that was used to take care of the expenses of cleaning up the place. We also had radio, and I believe eventually a TV installed. This, of course, all was abandoned in later years when that building was converted to something else.

Another old-timer, whom I might mention at this time was Frank Depp. Frank Depp had been a resident engineer, and he was transferred eventually as district engineer at Elko. Right after World War II, I had gone to Elko.—I mentioned this before; we had just learned how to determine the amount of air in air-entrained concrete. And I had gone up to show Stanley Doty who was resident engineer on a job out at Elko, how to perform this test, but was delayed for more than a week on account of the lumber (used for forming concrete) shrinking. Right after World War II—cured lumber was in short supply and the green lumber, after it was made into a structure, shrank so much that it had to be torn down and rebuilt in order to get the correct dimensions on the concrete structures. And while I was there, Frank Depp passed away. I believe that was 1946 or '47.

Another of the fellows who were here quite a long time ago was C. E. Wood. He came in under Robert Allen's administration.

And he was first placed in the laboratory to help us out in there. However, Wood was not particularly accustomed to laboratory work, so he was assigned to what we call a materials survey section. A very fine geologist (I can't think of his name right now) was also hired, and this geologist [Carl Stoddard] and C. E. Wood worked together up into the Verdi area to make a materials survey—that is, to find out about where the good gravel deposits were that we could use for future construction. After about three weeks, they came back with a most excellent geological report. Unfortunately, however, they did not have a pound of usable gravel. So we had to send R. C. McLain, who could smell out gravel; he just had a natural tendency for it. He was not an educated man, but he could locate good gravel. We sent R. C. McLain up to do the materials survey.

C. E. Wood was later transferred over into Ely as district engineer and he worked under Allen, I think during Allen's entire administration. I recall that he was one of a party of about six of us who went down to New Mexico for a highway convention. I've described this earlier.

Now, some of the later men—I'd like to speak of, that is [those who] also have been in service for a long time but not the real old-timers. One is Vernon Sharp. Now, Vernon Sharp, the last I heard of him [he] was assistant district engineer in Las Vegas. He had a handicap; he was slightly, well, more than slightly, hard of hearing. But nevertheless he did a very fine job as a resident engineer and again as assistant district engineer. When Las Vegas was going rapidly, anyone connected with that district—the chief engineer and all the assistants—really had their hands full. I recall riding around with W. O. Wright when he was district engineer and we found some surprising things. We found where some of

the ranchers in Moapa Valley had cone out and borrowed some culverts out of an old abandoned road and left them dangerous there so that a traveler might fall into a hole. We also found where new buildings were put up rapidly and someone without permission had built approaches into the main highway which should not be there. Those kind of problems seem to come with rapid growth in population. I believe Vernon Sharp may have retired by now. I'm not sure.

Owen Joseph was another man who had been employed for quite a long time with the Highway Department. He was, I believe, born in Carson City. He may have been an orphan's home boy; I'm not quite sure of that. But Owen was a resident engineer for many years, and he was also made an assistant division engineer in Las Vegas. Later years, he was moved to Elko as chief district engineer in District Three.

Michael E. Colletti [was] another very good resident engineer, who later became a district engineer in District Two at Reno. I recall Michael spending at least four or five months, during quiet times, in the late or middle forties, in the laboratory, familiarizing himself with various tests. He was not alone in this. Many of the resident engineers had gone through that process and they'd also visited other areas obtaining experience, which they would not get in the field. Michael Colletti is doing a fine job as district engineer in Reno; and he has two assistants, Dale Kulm, a graduate of the University of Nevada, is one. I've known Dale for some time, and in addition to being district engineer, he was appointed later, on the Highway claims board.

Then there was Ace Howard. Ace Howard came up from the bottom, and got up to near the top. He came through the usual process of chainman, rodman, instrumentman, resident engineer, and finally became assistant district

engineer in Reno in charge of maintenance, that is, in District Two. I knew him very well. I was out on several jobs where he was resident engineer; and he and I together had some words with Andy Drumm, one of our famous contractors, upon several occasions. After Ace had retired, he accompanied me for part of a year up at Lake Tahoe, where we did inspections on pipelines and paving. Ace now has a little ranch over in Fallon, where he's raising a few sheep, and seems to be enjoying it.

Then there was Henry Mayer. Henry Mayer, I believe, is a native Nevadan. I'm not sure about his education. But he was a resident engineer. His folks lived just across the street from where I lived at one time, in Carson City. But, he was out in the field, and he went through the resident engineer's duties up to finally chief district engineer at Elko, District Three.

While I was still in the department, a man by the name of Harold Rasmussen (a resident engineer for quite a few years, especially in the Elko district) was elevated to assistant chief in District Three. Harold may still have that job. I'm not sure of that.

Another man, who came rather recently into the state Highway Department, by the name of Glen Kritner, is also an assistant district engineer at Elko at the present time. I do not know much about Glen's background. I know that he had several very difficult jobs when he was resident engineer. One of them was up at Cave Rock to the state line at Lake Tahoe.

Now, there's another man who deserves a lot of credit for his work in the Nevada State Highway Department. His name is Herb Adams. Herb is a full-blood Indian. I don't remember whether he's Paiute or Washo, but he is a full-blood Indian. I'm not too sure about his education, except

that I was told that he completed in full the International correspondence Course in Highway Engineering. Herb was a good resident engineer. He had his problems. I recall one area in which he was working—again we had Andy Drumm, the contractor—and the problem was with some of the gravel that was being made, down near Montgomery Pass. But, he overcame the real problems, and was finally elevated to district engineer [in] District Five at Tonopah, a position which he still holds.

Another one of the earlier employees, who stayed with the department for many years, was Dale Rose. Dale Rose, an ex-resident engineer, lived in Carson for a while, while he was resident engineer on some local jobs. Dale also was elevated to district engineer in the newly created District Six at Winnemucca.

District Two at Reno and District Three at [Elko] really covered so much territory that it could not be properly covered by the district engineers and their assistants. Therefore the state, some time ago, I believe it was in the 1950s, created an additional district, of which Winnemucca was the seat.

Another man was Joe Sousa. Joe was resident engineer on some very large projects. I recall one on the Interstate 80; it was north of Lovelock, northeast of Lovelock on toward Winnemucca, for about fifteen miles. That was a heavy job, and Joe handled it very well. He handled many other jobs very well, and upon retirement of Dale Rose as chief district engineer, District Six, Joe took over. Mel Herrera, another ex-resident engineer, with long service, is at the present time, an assistant to Joe Sousa in District Six at Winnemucca.

Another man, whom I will mention later, was Homer Anrig who came up through about twenty years of engineering before he was promoted to district engineer in District Four. But, I'll tell something about that later

on. Homer is now chief maintenance engineer at the headquarters in Carson City.

We should mention some of the women who have been in long service. I have already mentioned Bonnie Reid. Now I shall mention Mary Rochon, and give some of her services as a state employee. Mary was born in Carson, and she attended Carson schools, and she graduated from Carson High in 1925, at the end of my first year in teaching. I did not have Mary in my classes. Between 1925 and 1928, Mary was hired as a clerk and typist by Mr. [W. G.] Greathouse, who was secretary of state at the time. And she was advanced in 1928 to deputy commissioner of the Motor Vehicle Department, a position she held until 1938; and at that time, I believe there was some change of politics, which made it necessary for Mary to look for other employment. Under Bob Allen's administration, she was placed in the materials laboratory as stenographer and typist, and she was one of the best. She stayed there from 1938 to 1946, and because of the work she did, I believe more than any other thing, she was transferred over to the Highway engineer's office and became secretary to the state Highway engineer, who was Robert A. Allen at the time. As a matter of fact, Mary has worked for seven state Highway engineers. A common saying is, "Well, she's gone through seven Highway engineers." She worked as secretary, for R. A. Allen, W. T. Holcomb, H. D. Mills, Edward Pine, W. O. Wright, John Bawden, and presently, she's secretary to Grant Bastian.

Mary's brother, Joe, of course a Carson boy, was at one time a member of the state assembly. And I recalled that her father ran a cigar store on Carson Street. He also sold candy, and I recall further how the orphan's home youngsters would take their Sunday school collections with them on Sunday, and would stop off in the Rochon store and

purchase a little item such as candy, and gum, and so forth.

I couldn't possibly pass over mentioning something about Art Loforth, one of the old-timers in the Highway Department. I do not know much about his start in life or his education. But I do know that he was a fine engineer. And he had been resident engineer on quite a number of the early projects in the state Highway Department. And about the time I came into the department, or shortly after, in the thirties I believe, he was made an assistant Highway engineer in charge of construction. They called them that in those days rather than construction engineer. Art, I don't believe, was married at the time he came into the Highway Department. He was a very well thought of man. And he could go out on a job, making a preliminary estimate and survey, and could more or less vision without any problem, what the future road should be and what had to be done in order to get it that way. He was excellent in that kind of work. He was well thought of by both the contractors and all engineers. Unfortunately, he developed a heart murmur, which began to get more serious as time went on. And in the meantime he had secured a wife; he became married. This lady, while I was not really acquainted with her, seemed to—I don't know what to call it, henpeck—she kept Art pretty much under her wing. Art liked to get out with the boys and have a few drinks. Of course, he was not supposed to do that. I recall at one convention that the eleven western states held in Reno, sometime in the thirties, where quite a number of us were in some kind of a meeting place, and we were having a few drinks, Art was there, but his wife was not with him immediately. Someone said to Art, "Say Art, hadn't you better go easy on that? Your wife—she'll really get after you."

And he'd had a few, and I remember he turned around and says, "I'll blow my breath in the tiger's face!" He hadn't any more than got that out, and in came Mrs. Loforth, walked up to him, took him away from the bar by the arm. He went away as meekly as could be on out the room. Art passed away in 1946.

There are others, whom I should mention. One is James Wallace. I do not know Jim's early history, but I do know he was a mighty fine man. He was known to me principally for his work in the right-of-way department. And I know that he was a good traveling companion; I went with him on quite a number of trips where there was some question about ownership of ground the state wanted to use for a gravel source. I recall one rather humorous incident. And I think I have mentioned that earlier, but I will repeat it at this time.

We had gone over to Fernley to examine an area we had wished to use for gravel, and this was on government ground originally, but had been taken under purchase by a sheep man. So, we went over, found the sheep man with his sheep, and took him in the car over to the area we wanted to open up and use for gravel. We arrived at that particular spot, and here were huge stockpiles of gravel already crushed and screened there—no doubt prepared by our maintenance people. In those days, it was pretty much customary for our maintenance boys to go out, get gravel where they found it without paying much attention to the owner. Jim and I, to say the least, were very much embarrassed. [Laughs] We wanted to make a deal to use the gravel. And here the gravel's already prepared and being used. The state bought the gravel that was prepared.

Jim organized his department very well, and the right-of-way boys had plenty to do, in fact, more than plenty, on the introduction of the Interstate system. One of his employees

was Carl Springmeyer, and Carl and I went all over the future route of Interstate 80 and Interstate 15, respectively, and located every area that looked like it might contain gravel—that is areas which are on public ground. Carl, I have described before. He was a good engineer; he had been a, resident engineer and ended up in the right-of-way department. But on account of illness, he retired some years ago. Carl passed away about five years ago.

There are a number of other people in the right-of-way department, who I may mention from time to time. I think Clarence Eiche should have some credit. Clarence Eiche is present head of the accounting division, and has been for some time. I am not familiar with Clarence's background, but I do know he has quite a number of people working for him, and has been in charge of the accounting system. Clarence also has been very active in Masonic lodge work.

I have already mentioned Carl Springmeyer in connection with right-of-way department, and James Wallace. But, there's another Springmeyer I wish to make [mention of] at this time—Stanley Springmeyer. Stanley was in the Highway Department as a draftsman, and he remained in the drafting department, I think, all during his Highway days. He passed [away] just a few years ago. But Stanley was a good draftsman. He designed quite a number of the big projects. I recall that the last design made on the Carson to Reno highway, between Carson City and a point just beyond Lakeview, was done by Stanley Springmeyer. Stanley, also, was one of my fishing partners. We had some nice times together on Walker River and Carson River.

Another old-timer, who was an old-timer—then he left us for a number of years and came back, and finally retired from the Highway Department, is Dan Indermuhl. I knew Dan Indermuhl in the thirties as a

resident engineer. We [did], I do recall, in particular, a portion of the highway from Carson Valley up over the summit toward Topaz Lake. This was a large job at the time, and contained a good many miles. As a matter of fact, very little of it has been rebuilt since that time, in spite of the fact that the gravel deposit used was not the best in the world. I personally got in bad with some of the people for rejecting about four miles of gravel after it had already been windrowed and prepared, because I didn't think it would hold up. That gravel was wasted and new gravel from a better source was put on the road. And for a short time after that, I was not allowed to get out into the field on too many projects.

Dan left the Highway Department, and seems to me he went down to South America or Central America. I can't remember which. And he did special engineering work there for some time. Later, he came back into the Highway Department, but was placed in the office on the office force. And he stayed with the office work—I don't recall whether it was in drafting, or in just which department he worked—but he retired just recently.

John Flournoy was quite well known to me; he and his wife, Ruth, have been friends of ours for quite a number of years. As a matter of fact, they rented a small place from us for a couple of years, while John was working in Carson City. John was born in Alturas, or near Alturas, California, Modoc County. I believe he had five brothers, and they were all athletes. As I recall the scuttlebutt, the five Flournoy brothers beat all the basketball teams in the area. John had his grade and high school work near Alturas. The high school was called the Modoc County High School. He went to the University of Nevada, and obtained Bachelor of Science in engineering and agriculture. I believe he had started in engineering, but he finished up in agriculture. He was a very good

athlete, and participated in quite a number of sports at the University. John spent some time in the Depression years, after he graduated, with the Goodrich tire company. And he also spent some time in the state planning, under Gilbert Ross in the WPA. And later, he came to the Highway Department, under Billy Holcomb in the planning section, and he worked there for a while. Then he spent four years in the materials and testing laboratory. He did various tests, in fact was familiar with practically all of the tests we made, except the chemical tests. He did quite a lot of work in the asphalts, and since he was quite knowledgeable in mathematics, I taught him quite a little about the mathematics of statistics. And we ran a number of statistical values on certain tests, partly to determine the value of the test itself. We ran means and percentile ranks and standard deviations, and when we compared one set of data with another, we used the Pierson coefficients of correlation. A lot of those charts, I think, are still available in the file somewhere, if the files have not been destroyed. But no write-up was made from them. What we did in research, was done usually in the times of the year when there was little work. And the matter of getting things in final form got neglected.

John left the Highway Department, and he went into the Navy in 1942 and served three years. And he came out as a full lieutenant, and is now a lieutenant commander in the Reserve. After coming out of the Navy, John left the department, and went into insurance adjusting for about four years. He rejoined the department before his fifth year's absence was up, in order to retain his—at least partly in order to retain his retirement years, and he was put into the right-of-way department. And he was made an assistant to James Wallace, who was the chief right-of-way engineer. And after Jim's death, John was acting chief right-

of-way engineer for some time, but he was not given the top job. The reasons, I do not know, but [they] may have had something to do with age, because John had enough years in to retire at the time. And I presume the officials who make appointments take into consideration the age of a man before the appointment is made. However, John was quite disappointed that he did not get the appointment. He retired in 1971, and he and Ruth live in Reno.

Now the state found it necessary to institute—well, let us call it an architect[ure] department. So many of our maintenance areas out in the deserts had no decent facilities in which the family of these men could live. So, it was the policy of the state Highway Department to build suitable quarters, living quarters and places where the equipment could be cared for, in these various areas. And, of course, the smaller areas outside of the district are the ones I'm talking about now. However, Jack Cooney was made the chief architect in this work. And not only did he and his chief assistant, Dean Fialka, perform a very good job in designing these living quarters and areas, all of which were fenced in, for the maintenance people out in the boondocks, but they also designed quarters at the district headquarters for maintenance equipment and offices.

I might mention one thing about Jack. I first knew him in 1938, when I was on the first general committee to handle the first Admission Day celebration. It so happened that I was chairman of the committee on grounds, and I believe I also had something to do with traffic. But, in the grounds work, it was my job to arrange the capitol grounds on the west side with chairs, so that an audience could view a pageant. This pageant depicted the early history of Nevada, and it was written by Mrs. [Ella] Carl Gottschalk of Reno. Mrs.

Gottschalk was the wife of Carl Gottschalk, who for a number of years, was our chemist in the laboratory. And Jack was the producer of this historical pageant, and the director was Mrs. Vera Sale. This was all done under the WPA with Gilbert Ross. Gilbert Ross headed that up at the time.

Dean Fialka and Jack together, have worked in harmony for a number of years. Jack, however, is retired. I don't think Dean has yet retired. They have done a lot of traveling, and a lot of work in fixing up decent places for our maintenance people to operate, and for their families to live in.

There are seven of the old-timers. These people deserve some mention. I will have to do most of it from memory. I do not have full knowledge of their early lives. But of these seven, there's Dale Pruett, George Egan, August "Dutch" Berning, Frank Berger, Frank Lyman, and Paul Rawls.

Dale Pruett, I first knew in Carson when I started in the Highway Department, as a former material survey man, who had been transferred to the right-of-way department. Dale, in the very earliest days of the Highway Department, would take a crew of men out and prospect, by hand digging, places to secure gravel. He was later transferred over to the right-of-way department, and as I recall, he was the right-of-way engineer for a number of years. Dale developed poor health, and passed away as a fairly young man. His wife, Rubel, however, was hired. As a matter of fact, the Highway Department seemed to have a policy of—when they could do so—hiring widows of deceased men employees, whenever those women were able to do the work required of them. And Mrs. Pruett, Rubel Pruett, worked until her retirement in the Highway Department. Dale's daughter, also, worked in Carson in the legislature for quite a little while, and was, for a number of

years, a neighbor of mine, until she divorced her husband and remarried and moved to California.

George Egan was a noted engineer in the Highway Department. I do know that he was a University graduate in civil engineering. And he came into the Highway Department probably about the same time I came into Nevada to teach school. And his earlier years were on a survey crew, and he did very efficient work. I don't recall that he was a resident engineer, but he may have been a resident engineer on a job or two. He was brought into the headquarters office, and was made, I believe, first bridge engineer, and then chief design engineer. And he handled the thing very well. And he deserves credit for the first set of standard specifications prepared by the state of Nevada Highway Department. George Egan compiled those specifications almost single-handedly. George, during World War II, joined the Al-Can crew of engineers, and spent some time there. He later came back, and was placed as engineer of special projects in the Highway Department until he had the minimum requirements to retire. Then he left the department and went over into California, doing private engineering work. But I believe he joined some engineering outfit over there. At the present time, I understand George is in rather poor health. George and Ida Egan and family were neighbors of ours for many years in Carson City.

Ralph Ottini, who is, was deputy Highway engineer in charge of operations and planning for some time, was born in Seattle, Washington. And he attended grade school and high school in Redmond, Washington, which is near Seattle. He attended the University of Washington at Pullman, which at that time, was called Washington College, and received a Bachelor of Science degree in mining and metallurgy. And coming to

Nevada, he first worked in an assay office in Reno, and later went to Mina where he served as a mining engineer for a short time. He came to the state Highway Department under R. A. Allen in 1935, and worked in design for a time, and transferred to the right-of-way division. A short time later, he was made the first traffic engineer in the Nevada state Highway Department. Then in July 1966, he was advanced to deputy Highway engineer in charge of operations and planning, a position which he held until his retirement in 1971.

Now, although I retired from the Highway Department, January 1, 1968, and worked for them as a professional engineer during 1968, I still am going to talk a little bit about the more recent changes in the department heads. There's changes in administration heads in 1971; with John Bawden and Ralph Ottini retiring, it left vacancies. In 1971, Grant Bastian was elevated to Highway engineer. He had been a deputy in charge of field operations, replacing George Griffith. And Donald Crosby was brought up out of the drafting division, and made deputy Highway engineer in charge of engineering. And William H. Shewan, who had been in the bridge department, and structural department for many years, was made deputy Highway engineer in charge of operations.

I'll give brief biographies of these men, although I've been out of direct service in the Highway Department. Nevertheless, I had known these men for a number of years, and had worked closely with them.

Now Grant Bastian was born in Hiko, Nevada. He finished grade and high school in that area. Grant says he was known as "the kid from the Hiko ditch." His father was prominent in Nevada politics for a number of years, having been assemblyman from his area. And he was one of the assemblymen who helped Percy Woodgate and I get a bill

through the legislature, which enabled us to get out of that old dark hole in the basement of Heroes Memorial Building, and into a new laboratory. This occurred in about the mid-1930s. That was the first laboratory built as such, and it was built west of the Heroes Memorial Building.

Grant attended the University of Nevada, and graduated with a Bachelor of Science degree in civil engineering. He joined the Highway Department [in] 1960 and [was] placed on a survey crew, and was made resident engineer in 1962. He was a brilliant man, and his advancement has been rapid. He handled some of the heavy construction projects on Interstate 15 in Clark County, and in 1966 he was made assistant district engineer in District Three at Elko. Just one year later, he was brought into the headquarters at Carson City as assistant construction engineer; and in 1968, he was made deputy Highway engineer. And of course, he is now the state Highway engineer since, I believe, August 1971.

William H. Shewan, one of the deputies, says that he was born in Lovelock, but he attended grade school in Candelaria, Nevada. I have been in the place once occupied by the town of Candelaria, and there's not much left there. Certainly it's a rather defunct town. I was surprised to know that there had been a school there. Bill, as we call him, finished his grade school and high school work in Carson City. And he attended the University, where he graduated with a Bachelor of Science degree in civil engineering. He came into the Highway Department in the bridge division, right out of college. And he worked in structural design for many years under Ed Boardman, who was bridge engineer, and was assistant bridge engineer under Allan Odell, after Boardman's retirement. He was advanced to deputy Highway engineer in charge of operations in 1971.

Now the other man advanced to deputy Highway engineer in 1971, was Donald Crosby. Donald was born in Reno, and had his grade school and high school education in Sparks. He attended the University of Nevada for a period, and then transferred to John Carlton College in Stevensville, Texas and took up engineering. He was sent overseas in the Army in the European theater, in World War II, and was a prisoner of war in Germany for six months. And after coming out of the service, he went into the Highway Department, and was assigned as draftsman. He was one of the few people to complete in full, the International Correspondence Course in civil engineering, a four year course; he did complete that in full. He was made Interstate roads engineer in 1961, in the design section, and was advanced to assistant deputy Highway engineer in 1967 and promoted to deputy Highway engineer in charge of engineering in 1971. He's been a registered professional engineer for about twenty years.

There are some other recent appointees to higher level jobs, who should have the privilege at least of, stating something about their life and actions in the Highway Department. And I'll start out with Robert Sharp, who presently is the chief road design engineer. And that was a recent appointment.

Robert was born in Elko, but apparently his folks lived in Wells, and he finished his grade and high school work in Wells. And then he worked for a short time in the Highway Department as a stake puncher and chainman about one year, I think that was. Then he attended the University of Nevada for a short time in 1942, and went into the Navy for three years. He was a radio technician, first class, in the Navy, he went into the field for the Highway Department and worked there through various levels. He started out

probably as a chainman and rodman, and was advanced to instrument man. And he worked in the field until 1950 when he was transferred to design at headquarters. And he was advanced up the ladder in design from time to time. And he finally was appointed as the chief road designer when other changes were made. By the way, his daughter Roberta, a University of Nevada student, was "Miss Nevada" in 1966. And Roberta worked for me in the laboratory. I believe it was the summer of '67.

Another man who deserves mention is Bill Nagel. Bill was born in Virginia City. He attended grade school there, and high school in Virginia and in Carson City. He attended the University of Nevada, and graduated with a Bachelor of Science degree in civil engineering, but spent time in the Highway Department during his University career, in summers. And then in World War II, he went into the Navy. And he didn't finish his University work until after he came out of the Navy. And then he completed his Bachelor of Science degree in civil engineering. He went into the highway design division upon graduation and he spent most of his time on Interstate design, and was advanced to principal designer on Interstate, and later was made chief road design engineer. And just recently, he has charge of the entire fourth floor. He was made assistant deputy Highway engineer in charge of roadway and bridge design.

Now there was Homer Anrig, who has been in the department for a good many years. Homer was born in Salt Lake City, and he spent his boyhood in Wells, Nevada, where he finished grade school and high school. He did not attend college, but during his career in the Highway Department, he stuck with the ICC course and completed the highway engineers [course] in this correspondence

work. And he served a couple of years in the Air Force during the war. And when he came out, he entered the Highway Department. And then in 1947, he was advanced up the line in the field to resident engineer. In fact, most of his work has been in the field. He served twelve years resident engineer on a number of Highway projects. And in 1968, he was made assistant maintenance engineer, with headquarters in Carson City. And in 1971, upon retirement of Victor Clyde, he was advanced to the chief maintenance engineer—a position which he holds at the present time.

Keith Layton, a very good engineer, who has been with the Highway Department quite a number of years, and a good friend of mine, certainly deserves mention. At the present time, he's assistant deputy Highway engineer in charge of maintenance and construction, and of course, he's located in headquarters. Keith was born in Shelby, Montana, but he had his grade school and high schoolwork in Battle Mountain. He attended the University of Nevada for a while, but he did not graduate. However, during the course of his work in the Highway Department, he finished the International Correspondence Course in highway engineering, which has stood him in good stead, because that's a very fine organization. And in 1948, I believe it was, when he started [at] the Highway Department, he was, of course, placed out in the field, and he advanced on up the line like they usually do, to resident engineer status. He served as resident engineer for a number of years up until 1963. And as a resident engineer, I had quite a lot to do with his projects. And he called upon me a number of times when there was trouble afoot. And we always managed to get things squared away in good shape. In 1963, he was made assistant construction engineer

and [was] brought into the headquarters [of the] Highway Department. He served that way until 1967 when he was advanced to assistant deputy Highway engineer, and of course, that embraces all of maintenance and construction.

I might explain that the maintenance usually is under the direct supervision of district engineers, but general things pertaining to maintenance, all over the state, are handled pretty much out of Carson City. And general propositions with respect to construction are the same. And Keith's experience, and knowledge, and his ability to get into a problem and solve it has stood him in good stead. I made several trips with Keith, out-of-state trips; I think I mentioned one or two in the past. And we always managed to get something out of those trips, and have a little fun on the side.

Ed Marriage, who at present time is the chief construction engineer is one of the two sons of E. C. D. Marriage, our ex-state librarian. Ed's father was also quite a literary man. I believe he did some writing for *Encyclopedia Britannica*. And he was well noted. He kept his English accent very well; I believe he was born in England. And for many years he lived in Carson City. And he was active in Boy Scout work, and many other community affairs, and was a very fine Rotarian, a past president of Rotary.

And now in going to Ed Marriage, I might say, first of all, at the present time, he is also a member of Carson Rotary. Ed was raised in Caliente, but there was no hospital in Caliente. His mother gave birth to him in Cedar City, Utah. The family moved to Carson City in 1935, and Ed finished grade school, however, in Caliente, and he finished his high school in Carson City. He did not go to college. He went right out of high school into the Highway Department, which was June 7, 1941. And he

started as an assistant inspector on hot plants, that is, asphalt plants. And he was made a full inspector in 1944. He stayed in the field for his first ten years or more I think—maybe twelve years. And he was advanced from inspector to instrument man, and in 1949 he was advanced to resident engineer. So he continued in the field, then, for some time. In fact, he served as resident engineer for five years, and in 1954 he was transferred to the testing laboratory, and was placed in charge of what we called the materials survey. At the time, he replaced Robert Arkell, who got in bad with the powers that were running things at the time.

Ed remained in the laboratory until April 1962. During the time he was here, he had full charge of material survey crews. And, due to the Interstate program, it was necessary that we get good equipment, equipment that would do a lot of work, and do it rapidly. So there were four of us who took a trip down to California to study their methods. I'll discuss that a little later, when I talk about another department employee. But we did secure new equipment, and Ed was better able to do more work, and do it much more rapidly than had been done before. He left the lab in 1962 to do some private work, for about five months. Then he came back into the Highway Department as assistant district engineer in Ely, District Four. That was in March 1963, and shortly thereafter, he took over as full district engineer. He was appointed construction engineer at headquarters in Carson City July 1966, a position which he still holds. Marriage was noted for his field work, especially for hot plant and street inspection in asphaltic concrete work.

I might mention here the name of Bryant Clary. Bryant Clary was appointed traffic engineer in September 1966. I've really forgotten just what his title was prior to that time. But he had worked in the Highway

Department for a number of years. I believe, however, he was in the planning department for a number of years. And Bryant served until June of 1967. At that time he passed away. I'm sorry I do not know more about his history, but I believe he must've served twelve to fifteen years in the various sections of the Highway Department.

In referring to traffic engineer, I must discuss something about R. C. "Bud" Hill—"Bud," we all called him. Bud is my next-door neighbor. And he was a product of Rhode Island. He attended grade school and high school in East Providence. And he graduated with a bachelor of science in civil engineering from the University of Rhode Island, in 1948. He worked five years in the New England area, two years of which were with the Soil Conservation Service, and three years with the Charles McGuire and Associates consulting firm. At that time, he was working on the Olneyville expressway. He came west, and in 1953 joined the Nevada Highway Department, in the building section. After fourteen years in roadway design, he was advanced to traffic engineer, upon the death of Bryant Clary. He presently has served six years in this position, making a total of twenty years in Nevada state Highway Department. Bud and his wife, Betty, are very good neighbors. We both live on Angus Street. I believe Bud and Betty moved there about fifteen years ago. Bud is quite an athlete. And I believe he has had considerable experience playing hockey. He's quite a hockey fan, and he is also an ardent skier.

I must mention Ed [Edgar] Boardman, the son of Professor [Horace P.] Boardman, whom I believe was dean of engineering at the University of Nevada. I'm not sure...I probably am mistaken about stating that Professor Boardman was dean of engineering. He was

professor of civil engineering for many years, and was very active in the community.

Ed, his son, was born in Chicago. His family moved to Reno, and Ed finished grade and high school in Reno. He attended the University of Nevada, and graduated with a Bachelor of Science degree in civil engineering. Ed has had an interesting career. After graduation he worked for the American Bridge Company in Gary, Indiana for two years. And he spent the next two years in Chicago with the Lakeside Bridge Steel Company. And the following three years he spent with the Strauss engineering firm. I believe that was in Chicago. The Strauss engineering firm was given the job of designing the Golden Gate Bridge. And Ed spent his time working on the foundation problems for the Golden Gate Bridge.

Following these seven years experience, came the Depression, and for two years Ed was without a job. He came back to Nevada, however, and in August 1933, he was hired by the Nevada Highway Department as bridge designer. He received appointment as bridge engineer in 1934, and was chief of the bridge department until the time of his retirement, which was July 1966.

I recall one trip that a number of us took about 1940 to Seattle, to the Western Association of Highway Officials Conference. Ed was one of the members of that trip. I have previously mentioned that and a rather expensive joke we played on Ed, so I will not repeat it. I had occasion to confer with Ed many times upon the work on structures. The laboratory, at one time, was in charge of structure foundation exploration. We were not very well equipped to do it, but became better equipped after we hired a professional geologist. But, until the freeways came about, there actually were not too many major concrete bridges and overpasses in Nevada.

After the freeway design had begun, there were many interchanges, and bridges, and concrete structures.

Allen O'Dell is a man who deserved quite a lot of credit. Allen was Ed Boardman's assistant. At present he is the chief bridge engineer, replacing Ed when he retired. Allen was born in New York state. His folks moved to Churchill County, Nevada. And Allen attended grade school in the Harmon District school. That was before the times of busing and consolidating all these little district schools. The Harmon District is south and southwest of Fallon. He also attended the Churchill County High School, graduated, and attended University of Nevada, and in 1930 received a Bachelor of Science degree in civil engineering. After graduation, he worked for a short time in the irrigation service at Fallon, on the Newlands Project. Then for a few months he worked as hydrologist with the Indian Service at Bridgeport, California, but his office was at Schurz, Nevada. In 1931, he was hired first as designer in the Highway Department, but was shortly transferred to the field on survey crews. He spent seven years in field surveys, for both location and construction. He was transferred to headquarters and spent two years on roadway design, and in 1940 went into the bridge section, under Ed Boardman, as a designer. In 1958, he was made assistant bridge engineer, and upon Boardman's retirement, he became the chief of the bridge department.

I mentioned something about a trip when I was talking about Ed Marriage. But, there were four of us, who made a trip over to California to study boring equipment, and other equipment, which could be used in exploring foundations and doing materials survey. Ed Marriage [who] was working in the laboratory at the time; and Dick Acheson, who was assistant equipment superintendent;

Allen O'Dell and myself made up the party of four. Those two guys, Marriage and Acheson, were quite the boys. They took us on some out-of-the-way places. I recall we didn't have anything to eat for about seven hours one day, because they wanted to go to a place down on the Sacramento River. That was the first day out. And we lost the place, but they kept hunting [and] they finally found it. It was on a riverboat. But [by] the time we got there, about all they had was leftovers. We then went on to San Francisco, but first, I contacted one of the assistant engineers in the California highway laboratory, who went with me to an area near Vallejo, where they were supposed to have a piece of equipment in operation. I've forgotten at the moment just what Marriage and O'Dell and Acheson did, but I believe they had gone to some equipment shops. But, we hunted and hunted for that piece of equipment. And we finally—after four hours searching around Vallejo, we found where it was working. That night we all went over to San Francisco, and stayed at a motel. And the following day, we were to examine some of the equipment in the San Francisco area, which we did. The evening, however, was spent examining the hippie situation at the North Beach. Allen and I had all we wanted of it after just a few looks, and we made it back to our motel. But I don't know when the other two made it back. In any event, the trip was worthwhile, because it did give us some ideas, and we did get better equipment to do our work.

Clarence Eiche, another department head, has had quite a little experience; he is the chief accountant. Clarence was born in Kansas City, Missouri. His folks moved to California, and he attended grade school and high school in San Bernardino. He attended a college temporarily instituted during wartime to train accountants. The name of this college

was Mount San Antonio, and it was located in Pomona, California.

Clarence received an AA. degree from that school. I'm not sure how many years he spent there, and I'm not sure what the A.A. stands for, probably something like Accountant Associate, or something else like that [Associate in Arts]. Clarence decided to come to Carson City, which he did. And he went into business in motor supply, which he handled for about a year—1948 and 1949. Apparently, he did not do so well there, because in 1949 he went into the Highway Department as statistician in the planning division. He held that position until 1951, when he was placed in charge of the IBM system, which was newly installed. Three years later, he was made assistant accountant, under Ernie Pohl, who held the job for many, many years. And in 1956, he left the department for a seven-month period to do private work, but came back to the department in January 1957, as chief accountant. He says he has had many troubles in this job, but he says he manages to survive them. He said the present one, which has received so much publicity, is not bothering him a great deal because he's more or less used to such things. Clarence has been quite active in Masonry through the years.

I must mention Percy Crocker. I do not know about the place of birth or the education of Percy. I first became acquainted with him through his two daughters, who were schoolmates of my three daughters. And Percy and his wife were at my house on several occasions, always for the Christmas party, which we made a custom of having. But, he started out in Nevada—at least to my knowledge he started out, as superintendent of the Dayton dredge, which was dredging the aggregate in the canyon that empties into Dayton. This was an extra large dredge.

It was rather unique. It was called a “walking dredge,” and I believe the bucket would hold something like fifteen yards. I may be wrong on that. And the gravel, of course, was then dumped upon a barge where it was washed and the gravel separated from the gold. I’m not sure just how much gold was dredged from the area, but they worked there for a number of years, and an immense waste pile was made, which has since become a source of gravel. I’ll describe later on a study I made of this deposit, after I was finished at the Highway Department.

Percy went into the Highway Department when the dredge was through operating. Incidentally, I might mention that the barge had an office, which was glassed in practically all the way around. And when they were tearing things down, my father-in-law purchased the glass from that, and he used it to build a greenhouse in the half block of land which we had rented [to him and] where he started a small nursery. Percy went into the Highway Department as inspector. He worked under the bridge department, and did all of his inspecting on structures. And he was on some very important structures on freeways. He served long enough to qualify for retirement, and he and Mrs. Crocker now live in southern California. I hear from the Crocker family every Christmas.

Now there are several other people who should be mentioned, but I cannot give too much about their work nor about their life history. I will mention those people. First, there’s Bill Engle, who has been the public information officer for quite some time. I never was closely associated with Bill, in his work, but I know he’s done a good job of it, and is still a public relations officer. His office has been very kind in furnishing me data, from which I’ve obtained quite a lot of information, I have given to Mrs. Glass.

And there’s Donald Bowers. For quite a little while, the *Nevada Highways and Parks*—in fact, from its inception until just a few years ago—was placed under the state Highway engineer. And I know that Donald has done a good job with that; however, it has been taken out of the Highway Department, and I don’t know, at the present time, just how it is departmentalized. It may be a department in itself. But, I believe the publication comes out now, either three or four times a year. And, it has developed into a very worthwhile magazine.

Then there’s the chief photographer. I must mention Adrian Atwater, not so much because he photographed much of the testing (however, he did take photographs for some of the equipment and some of the operations which are shown pictorially in some of the biennial reports), but, we as a family, thought very much of Adrian because he worked for us as a private photographer when our daughters were married. And he also took some pictures of my yard, with the flowers. And I have one picture, of which I think a lot, of my smallest grandson, when he was two, wearing an old straw hat of mine and playing with a toy out in the marigolds.

Now there were a number of Highway equipment superintendents. I was fairly well acquainted with most of them, but about our laboratory’s only dealing with [them] had to do with purchase of equipment, and use of transportation. Frank Morrison had his own auto—that is, an auto assigned to him by the state. After I was chief testing engineer, I did not have an automobile, because the office work became so heavy, I didn’t have much time, as much time as I should have, to travel. On the other hand, Morrison spent most of his time in the field while he was in the Highway Department. I’ve forgotten the name of the first equipment superintendent,

way back at the time I started in. But I do recall, I believe it was under Bob Allen's administration, when Art Revert came in as equipment superintendent. And all these equipment superintendents had some wonderful mechanics and assistants working with them. I can't name them all. In fact, I could name very few. Art Revert was replaced in 1942 by Mat Walsh, who held the job until 1950. His assistant, Charles Blaker, took over in 1950 and held the job until 1959.

Charles, I recall, was a good-sized muscular man, and he was noted for his ability as a strong man. I believe it was during Charles's administration, perhaps just before that time, when he succeeded in moving the two-hundred thousand pound testing machine [used] to test steel and concrete, [he] moved it from the old laboratory building into the new Highway building basement, where we did the testing for many years. And that was quite a little trick. As a matter of fact, we had to move the machine in before the wall of the basement was placed. And Charlie did a bang-up job on getting that done. It was a good job, and everything worked after he was finished with it.

Charlie Blaker was replaced in '59 by Frank Quilici. And Quilici held the job for the rest of his life. He passed away in 1970 or 1971. He had worked for many years in construction, and I believe principally, with Isbell Construction Company. But Frank was well versed in all phases of equipment, from purchase and repair, to disposing of junk and so forth. And I came across Frank many times, when I was traveling in the field, in the district offices. He was very well thought of and did a fine job. His assistant, Richard Acheson, took over and is presently the chief of the equipment division. I have mentioned Richard on a trip that several of us took together.

I must go way back now and mention a man I had considerable to do with, and I like him very much as a person. And that was Bernie Hartung. Bernie Hartung came in under Bob Allen's administration, and I believe he came in as personnel—in charge of personnel; at least he replaced whoever was doing that before (perhaps we never had a personnel officer before Hartung). I didn't think much of the people he gave to us in the laboratory, and I'll remark about that. But after the personnel, he was also made director of traffic and safety. He married Fay Winters, the youngest daughter of Ira Winters, an ex-student of mine—Fay, that is. In fact, all three of the Winters—John, Ira, and Fay—were students of mine when I taught in Carson High. As a matter of fact, our daughters were the babysitters for the Hartung's youngsters. Bernie was one of the charter members of Carson Rotary. He was really a convivial person, and was well liked as a man about town. I believe he was born in Reno. In fact, I'm sure he was. His father was a barber. And I'm quite sure he attended Reno schools, and I believe he graduated from the University of Nevada. In fact, I'm quite sure that he did.

Now, I'm going to say just a little bit about some of the help he produced for the laboratory. At the time Mr. Allen came in, we had quite an assortment there, and Bernie picked these people out. Some of them were all right. We had Morris Anderson coming in. He was presumed to be an assistant, I believe, possibly to have taken my place when the politics changed. In those days, everything was done by politics, and not by personnel administration. But, that didn't work out. Morris was a mighty fine fellow. And we enjoyed he and his wife, and his family—that is, my family enjoyed his family. But, he did not exactly take to what was going on in the lab, and he was transferred into other

things. One thing he was given charge of was something about some landscaping. We did not have a landscape engineer at that time, but I know he got into a little trouble. He came to me. He wanted to fix up a park in Elko. So I took it over, and in my spare time I laid out the Elko Park, and somebody else put the finishing touches on it. Whether or not the park was ever built to the design, I do not know. I didn't check it very carefully.

Another good employee we got under Bob Allen's administration (I believe Hartung had something to do with the choice of him) was Carl Gottschalk. Carl was an excellent chemist and had been a professor. I'll tell you more about Carl when I describe the people in the laboratory.

Another fellow who came to us, because he had been a good Democrat and a member of the legislature, was Johnny Curtis. Johnny had only one arm, but he was an excellent mechanic. And he could do things with that one hand that other people couldn't do very well with two. Johnny got so he was very proficient in running what we called the Atterberg limits, tests on soil. One of the tests consisted of rolling out a soil to an eighth-inch thread—that is, if it were clay, it could be rolled out to an eighth-inch thread. And Johnny was expert on that. Johnny had a bad habit though; he couldn't divorce himself from John Barleycorn. And the little guy passed away. I'll say more about that later on.

Now there's some fellows I call "beauts." We had one fellow by the name of Dr. Pedigo. He might have been a doctor, but I don't know of what. But, he was presumed to be a man of science. But, I couldn't stand this man. The thing that really did anything but sell me on him, was to see what he had done one day when he left the laboratory. On a fairly delicate balance he had about fifteen pounds

of books and junk on one side of it. Anyone who knows how to use a balance surely would not do that. And he did not last very long. I succeeded in removing him.

There was another fellow by the name of Doc Krebs, who was supposed to have been the doctor of medicine. He was a Hungarian by birth, supposedly, and lost his wife and family in a wreck of some kind. And he was also in the World War I, and had been bayoneted through the jaw. He came to us as an expert, but he had a habit of forgetting what he had started, and couldn't complete—and couldn't remember where he was. Well, we put up with him, because—I guess because we had to. But, we couldn't trust him with anything we really needed to be done.

Then there was poor old Pat Sanford. He was the son of [George] Sanford, the lawyer of some note of Carson City. But, Pat had been in an awful auto wreck and it disturbed his memory. And unfortunately, he did not have good motor control. He would try to weigh something, and he would get the balance shaking, so we simply had to give Pat manual jobs to do, such as shoveling snow, and cleaning of f the roof, and doing such things as that. We kept him on the payroll. I've forgotten what the occasion was, but he got tired of that, and I believe resigned.

But these were some of the people we had. And when you have people of that kind, you have to put other people in charge of them to take over. We were forced to do that under the political system. After we had a personnel system in, this kind of thing was pretty well dropped.

I had the responsibility of this. Mr. Morrison, being hard of hearing, didn't like the inside part, particularly, when he had this kind of people, and he spent his time in the field. And I had the whole bale of wax on my hands but managed to live through it.

LABORATORY PERSONNEL

I have stated before to Mrs. Glass, that a lot of the history of the Highway Department, with respect to actual accomplishments (that is, highways constructed and designed, and the money spent), that information is available in the biennial reports, and in files of plans. But there's never been much said in biennial reports about the people themselves, who have made the history. And I have, in the last few meetings, limited myself pretty much to talking about the people. And I have covered quite a few people in the Highway Department (outside of the laboratory), but I know I have not covered as many as I should. I covered those principally with whom I was associated one way or another over the several years, and I am sure I have forgotten some, but not intentionally, to be sure. I now will confine my remarks about people to those whom I came in contact with in the laboratory over my thirty-nine and a half years experience in the Highway Department. Then, too, I will not cover everybody, but those who stayed with us a year or more, or those who because of certain personal characteristics, or because of certain accomplishments, have an interesting background. And I will confine my remarks to those people. I've already described, I believe, pretty well, the chief of the testing division, that is as the chief who was head of it for a good many years—Frank Morrison. And I think I have said enough about Frank.

When I came into the Highway Department first, while I was still teaching, I did so on weekends, Saturdays especially, and again in one summer. Finally, I dropped the teaching altogether, and came on steadily in June of 1929. And at that time, the testing department consisted of Frank Morrison, the testing engineer, and Bill Robohm, who did most of the routine work. And the entire

Highway Department office staff in Carson City surely didn't amount to any more than about fifty people in those days.

I'd like to say something about Billy Robohm. Bill's history, his life history, I do not know much about, and I failed at the time he was employed, to ask him about some, of his background. I do know that he came of parents of German descent, and I believe he came from some such state as Minnesota or possibly Michigan (I'm not sure of that). But, he was interested in mining and prospecting from boyhood. And he came into Nevada, probably in the early 1900s around 1910, prospecting, (I think he covered the Tonopah area); then he finally settled in Silver City. And he became interested in mining there. He actually worked in some of the mines, and he had claims of his own. And he married while he was there. And when the mining began to play out, he obtained a job in the state Highway Department. Bill did not have much education. He probably went through school as far as the fifth or sixth grade. Nevertheless, he was one of the most thorough laboratory technicians I have ever seen. Once he learned a routine, he would never vary from that particular routine. Some such test as making what we call briquets, which requires certain thumb pressure as you fill the molds, to compress it, Bill had that down almost to perfection. He would test and test himself by putting the whole outfit on the balance or scales, and balance it, and then try his thumb pressure to see that he was getting the right pressure on that.

Bill was so thorough in his work, that [on] a piece of research I initiated, I left the testing all up to Bill, because he was one person doing it [and] the personal error, such as it was, would be confined to only one person. And if he did all these tests alike, the answers or the results would mean something. The particular

project, to which I refer, was one in which I had used a silica material—I believe it was diatomaceous earth, mixed with the regular cement, about one-fourth of the diatomaceous earth by weight to three-fourths of the regular cement. By volume, that would be almost one to one, because the diatomaceous earth is very light in weight. Then we made up the tensile strength specimens (I think I have told about this before); we made it up in a regular standard procedure, and we also made the briquets out of regular Portland cement without an additive. And we cured those, according to standards, and ran tension tests on them from time to time over a period of months. And the results, which have already been described, were that at first, the additive gave much lower strength than the briquets without the additive; but as time went on, the additive in the briquets slowly helped to gain strength, until after about ninety days the results were about equal, and after about a hundred and twenty days, there was actually a little greater strength to the tensile specimens in which the additive had been placed. This was probably a start in what is called low heat of hydration cement. That is a cement which because of its low heat of hydration (that is, when it starts to form), it can be used in huge structures where ordinary cement could otherwise not be used. And it also saves on the cost of the cement, because siliceous materials usually are much cheaper.

I think I've said before that a man by the name of Dan—I don't remember if it was Dan Priest, but his name was Priest, his last name—was traveling for what was called the Yosemite Cement Company, in those days. He followed the work we were doing quite closely. [In a] couple of years he came back and he said, "You know, we're making a cement now, based pretty much on that research." Sorry that was never published. The

work was there and available to anybody that wanted to see it, but that kind of work was not done exclusively in Nevada; other states and other testing laboratories had done the same thing. Nevertheless, Bill Robohm was the man who deserves a lot of credit for doing those tests, because of his faithfulness to routine. Bill, I believe, passed away about 1956 or '57, after having worked for probably as much as twenty-five years in the state Highway Department.

At that time, when there was only Bill and Frank Morrison and me, we decided to get some help in the summer. Norman Noteware, a boy who had gone to school to me, at least in his freshman year, came to us in the summer of about 1931 or '2 I believe, as a helper. And Norman was pretty much a steady employee for the state Highway Department for number of years. In the meantime, however, he received a college education. Norman was born in Carson City in 1913, and attended the Carson schools—grade school and high school. His father, Dorsey [Noteware], was deputy surveyor general for many years. And the father of Dorsey, Norman's grandfather, was one of the early settlers, and helped organize the state government. And he was the first secretary of state, and served a number of years as such. He was also for many years, grand secretary of the Grand Lodge of Masons in Nevada. Norman's mother was a teacher in the Carson schools, who taught, I believe, third or fourth grade, at the time I was teaching. And she taught for quite a number of years, until she became very ill. Norman worked for us his first three years out of high school, then decided to go to college. He had an uncle living in Stockton, so Norman arranged to live with the uncle; and he graduated from the College of Pacific with a B.S. in chemistry. After graduating, he obtained employment with the Standard

Oil Company as a chemist in the Richmond refinery. And, about that time, he married a Lodi girl, Alice Michelson. Norman worked for Standard Oil as chemist for three years, until his mother suffered a stroke in 1942. And his father, at that time, was in a more or less senile condition. Thus Norman gave up his California job, and he and Alice came to Carson to care for his parents. And we put Norman to work in the Highway laboratory almost immediately upon his return to Carson, as a chemist. He worked in the chemical section and in the asphalt section of the Highway testing laboratory, and was made professional, grade I as chemist in 1945. Both of his parents passed away, prior to 1945. And Norman was advanced to professionals grade II in 1946, and to grade III in 1947.

Norman developed a nervous condition about 1951, and he gave up for a few years, work in the laboratory. And he did special work from time to time out in the field, as field inspector. He also served three terms as sergeant-at-arms in Nevada state legislature, I believe in assembly. And he also worked for a time in a shoe store. He returned to the Highway Department, in the laboratory, in 1955, as senior physical testing engineer, which later on, was changed—the title was changed—to materials and testing engineer, grade III. That was 1961. He kept this title until his retirement in the fall of 1972. Norman suffered a severe car accident in January of 1972, and he was on leave of absence for several months but returned to work on a half-time basis 'til his retirement. During the last several years, Alice and Norman tore away much of the old Noteware home, which was one of the first homes. It was built on South Minnesota Street on the western side of the slope which is there. Actually, that is the slope of the main fault scarp which goes through Carson City. There were springs there, which

helped irrigate the place. And, as a matter of fact, one of those springs was tapped by the city of Carson and used to help produce water through the sewer system. Whether or not that is still working, I could not say. Alice and Norman have developed that place into a beautifully gardened place. They have three rentals on it. And the house, which they remodeled, is beautifully done, and it is really a joy to go through the place and see what they have done there. Norman had not fully recovered from his accident. One of his legs is in very bad shape, but he's taking treatment, and manages to get around at the present time.

Another one of our early employees was Ray Griffin. Ray was born in Ely, Nevada, and he graduated from the University of Nevada about 1933, with a Bachelor of Science degree in chemistry. He, by the way, was a nephew of Lee Scott, who was secretary of the public Service commission for many years. In those days, in the early thirties and forties, there was no state personnel system. As a matter of fact, politics seemed to govern who was employed and who was not employed, to a large extent. Some of us seemed to survive through several administrations, whether they were Democrat or Republicans—chances are because we paid a little more attention to the work than to the politics. But sometimes politics played quite a part in the naming of employees here and there.

Ray may have come in, partly on the basis of politics, but actually he was a very fine employee, and he did fine work as a chemist, both in the chemical laboratory and as an oil tester. In the early 1930s, hard times came about; and the budgets could not be met without doing something about personnel. And in those days, some areas in the state government decided to lay off the single men, men without families, one week out of every

four. It seems to me that Ray was subject to that, but I can't remember for sure. But those of us who were married and had families were able to work right on through. In those days, raises came few and far between. I recall that we worked for as long as five or six years some times without receiving raises. Anyway, one thing about Ray, while he was an excellent chemist and all, we did not have enough work for him during those lean years. So we sent him out into the field. It was a pretty rough deal he obtained, but he didn't complain. He was sent to Lovelock, where a small piece of Portland cement concrete paving was put in, with Otis Wright [as] resident engineer. And that concrete paving had to be checked for smoothness with a ten-foot straightedge made of hardwood and lined with steel. I think that straightedge must've weighed about fifteen pounds or more. And the inspector had to handle that all day long, checking for irregularities.

That was the job that Ray had, and he stuck with it, but it was not a pleasant job. Ray was given, occasionally, to go into a bar and take a drink or two like a lot of other people do. But, he came from Republican families, and the Democrats came in under Governor Kirman, I believe it was. Bob Allen was state Highway engineer. And Ray, apparently, was given to making a few disparaging remarks, here and there, about the Democratic party, which resulted in his release from his Department of Highways job. Between Frank Morrison and me, we made some good recommendations for Ray. We knew quite a few of the chemists and oil people and salesmen. And he became chemist with the Shell Oil Company and did very, very well. I did not follow his career too much, but I believe he passed away at a rather early age.

Another one of our earlier employees (as we began to grow, we added new ones) was

P. L. Woodgate. Percy L. Woodgate. He did not like the name Percy, but we all called him "Woody," and that satisfied him very well. Woody was born in Colorado; it was either in Telluride or Ouray (I can't remember which one). And he had his school there in western Colorado, grade school, and probably some high school work. And he worked, I believe as a salesman, on the western slope of Colorado for a number of years. He came to Nevada, and worked in hotels, particularly at Winnemucca, as a clerk. And, he and his family, wife and son and daughter, came to Carson in 1932. And Woody was employed in the lab until late in 1949, or early 1950. He passed away in 1950. Woody, during most of these years, was familiar with most of the physical tests, and was a very good employee. And he was in charge of the sieving lab. And he had several men working under him. He was a very hard worker, but he was physically handicapped in one respect, which was not to show up until near the time he passed away. He had had a kidney removed, and he had only the one on which to depend. And when that failed him, of course that was the end for Woody.

One thing I might mention, Woody and Clarence Meginness and I took a lease on the old Athens mine (I think I mentioned this before) which is west of Carson City. And it had rich gold in it in very small veins. And we worked it for a year or so, and managed to net, if we did not count our time, about maybe five or six hundred dollars. We had the milling done in the Trimble mill at Silver City. And we bought an old Dodge truck, an old Dodge touring car converted to a truck really, and it would pull up some pretty tough grades. We also, incidentally—that is, incidental to the mining—hailed a load of wood back with us every time we went up, because a forest fire in 1926 had burned quite a lot of

the timber; some of it was still standing, and some of it still made good firewood. But this was an interesting episode in our lives, and in addition to making a little money, we had some fun out of it.

By the way, Woody's wife had worked for quite a long time in the state, in offices; and his son, Mel, graduate of the University of Nevada in engineering, is employed by the Highway Department at the present time. The daughter, Sally, is the wife of William Dunfield, the Carson City postmaster.

Woody and I also did some lobbying in the legislature, I believe it was 1933, for a new lab. I have told about this before. We were in that old basement of the old Heroes Memorial Building, and all the smoke and fumes gathered into our rooms, and we couldn't remove it. And we did not have enough room to work. We had it smoked up in good shape when we asked the legislature committee, the Ways and Means Committee, to come over. They could hardly stand the smell of it, and immediately got a bill through to build a new laboratory. Woody and I did this under a Democratic administration. We were both Republicans at the time, but we didn't bother about that; most of us, the Highway Department, took to the woods or somewhere else, but we managed to get that bill through. And we think we did a good job.

Clarence Meginness was one of our earlier employees. I do not know about the place of birth of Clarence or about his education. He surely went through grade and high school, but I doubt if he had any college. He came into the laboratory about the middle 1930s, and he worked mostly in the physical testing laboratory, although he did some testing on the oils. He was a good employee. He was a strong, physically strong person—tall and wiry. And, because of his muscular ability, when we had some hard work to do and heavy

things to lift, Clarence was always the man, one of the men at least, on whom we called. He stayed on until about 1943, I believe. I've already mentioned Clarence and our experience in the Athens mine; however, he gave up before Woody and I did, and left the mining business. In fact, he left Carson City about 1943.

I recall some incidents that happened along about the time that, in the early forties—Frank Berger used to come over and visit the lab. Berger was the field engineer, who went out and checked over the contracts about progress and payment and so forth. But Frank would come over and visit sometimes with Clarence. And when there was not much doing, they would be out of sight for a short time. Morrison, who was the chief testing engineer, finally got on to that; we found them in the back of the storeroom, playing some kind of a game. It was either penny ante or possibly—I can't think of the other one, some kind of a card game. And he soon put an end to that.

I believe Clarence passed away about fifteen years ago, but I do not have the dope on it. I recall he was quite a joker or jokester, joke player. He and Melvin Ruedy, and I think some of the others fixed me up in pretty fair shape at one time. I was due to go to Las Vegas on some special work, and I had brought my suitcase down to the laboratory. And I noted that they were very solicitous about getting that suitcase into my car, so I let them do it. But, when I got out at Vegas and lifted the suitcase, I could hardly lift it. When I opened it up, they had it half full of remnants of reinforcing steel, which had been tested. There was about thirty pounds of that in addition to my clothing.

(I have discussed these people and what they did in the lab more or less in the order of which they were employed, as the Highway

Department and the testing laboratory began to grow.)

Melvin Ruedy was an employee. He came into the laboratory in the 1930s. Mel was born in Carson City, and I believe had some of his grade school work in Carson; but his folks lived for a time in Colorado and then San Francisco, when Mel was a young fellow, then settled in Reno, where Mel finished high school, and graduated from the University of Nevada in 1936 with a Bachelor of Science degree in science. He was employed in the Highway Department laboratory from 1936 until October 1940. He had taken ROTC training in college, and I believe he made second lieutenant, when he finished that. He also entered the National Guard while at Carson. And he went into the Army, World War II, as a second lieutenant in the Forty-second Division and served in the South Pacific. And [when] he came out and finished, I believe he was given the rank of major and went again back into the National Guard, and stayed with that until the time of his death; that is, he was in the National Guard in one way or another. Part of the time that he was in the National Guard, he was also doing private work. During World War [II], he received the Bronze Star, and Medal of Commendation. There may have been other medals, but of those two I am certain; of the others, I do not know about.

He worked as a civilian after coming back from the war for the J. R. Bradley Company, as a salesman, for the first two years. Then he was given the Reno area, as wholesale manager for another San Francisco hardware firm and he held that position until 1959. At that time, he took over the maintenance department in National Guard, with his title as major. Mel and his wife, Ruby, lived in Reno. They adopted two children, a boy and a girl, and had one daughter of their own. By

the way, that particular daughter is now quite a horsewoman.

Mel was killed in a bad accident in his home yard, by a tree falling upon him, while pruning operations were going on. This happened in 1961. His widow, Ruby, taught school for a number of years and at present is employed as librarian in one of the Sparks grade schools.

Another of the old-time employees is Fred Davis. Fred Davis was born in Denver, Colorado in 1898. His folks moved to Reno in 1900. Thus had his grade school, and attended high school in Reno. And he took a special business course in later years in San Francisco, and he also took some special engineering work at that time. As a young man, in 1919, he was assistant resident engineer on the first concrete paving job put in by the Nevada state Highway Department, just south of Reno. Many of us who are old-timers remember the concrete pavement between Reno and Carson City consisted of a concrete slab, eighteen feet wide, from Reno to Huffaker's. From Huffaker's into Carson City [it] was only fifteen feet wide. This particular job was done by Wood Brothers contractor, or partly done, and the resident engineer at the time was a fellow by the name of Montgomery, whom I did not know. I think he had to quit the Highway Department by the time I was employed in the department. The Wood Brothers went broke in that job.

Fred also served as assistant resident engineer on the sewer and water works. He did that for four years, from 1922 to 1926. I believe that was done out of state, possibly in Denver. In 1935 he came into the Highway Department, into the lab, and took a job as a tester, and worked as an assistant in the sieving laboratory for twenty-three years. Fred, and several of the other Highway employees, lived in Reno and commuted all during the years

of their employment. While Fred worked for the department for twenty-three years, he did not retire altogether. He left the department in 1958, and he worked for Harrah's in Reno until 1969. He is now retired for sure and says he is "goldbricking with the old age club."

James D. Goldsworthy, Jim, as we called him, came into the Highway Department about 1934 or '35, in Robert Allen's administration. I know very little about James's place of birth or his schooling, but I believe his schooling was mostly in Nevada. And I believe he took some work at the University of Nevada in mining engineering. He was always interested in mining, I recall, in the years he was with the Highway Department. His early experience, work experience, I believe was in mining. And when he came into the laboratory, about the middle thirties, he was given the title as an assistant testing engineer. He was not too familiar with the routines, but did assist in making some of the tests and finally got pretty well acquainted with them. And, after, about 1943, I believe it was, he was given the materials survey job, where he was in charge of developing the gravel and sand deposits, and so forth, for use in highways. He had a helper by the name of Louis McMurdo, and the work in those days was practically all hand work, hand digging. R. C. McLain had handled this work for many years, and Goldsworthy took over when McLain have it up. Last I heard from Jim Goldsworthy, he was living in Yerington, and I believe interested in mining. He stayed with the state 'til about 1950. And I believe when he left, he did something about mining. I do recall that during his work in materials survey, we purchased a drill rig, and instead of doing all the work by hand, did quite a lot of drilling—auger-drill type.

Another old-timer was R. C. McLain, "Dick," as we called him. I believe Dick came

in about 1929 or 1930. And he had charge, principally, of the prospecting for gravel and sand, until 1942 or 1943. There was a man, I believe, who could smell out a good gravel deposit. We were very fortunate in having him in charge of that work for many years. He had two men who worked with him, and it was all hand work—dug with a pick and shovel. And those boys were so proficient at it, they would dig a hole six feet long, two feet wide, and six or seven feet deep, and where the soil would hold up, it was almost perfect every time. And they could dig two, or three, or four such holes in the right kind of gravel in one day. Seldom did we get a bad deposit from R. C. McLain. Actual machinery for doing the developing of gravel deposits was not much used until we first tried the auger. Then, later on, of course, we had other machinery, which I will explain later.

I will never forget one experience with Dick McLain. He was bothered with kidney stones, and from what I saw of him, I know that is an extremely painful situation at times. I recall it was so bad at one time, he asked me immediately to take him over to St. Mary's Hospital, where a doctor would arrange to make the operation. On the way over, Richard was in such pain he asked me to stop near a wooden guardrail in Pleasant Valley, and he put himself across that guardrail, belly down, with his hands almost touching his feet. He said that's the only way he could get temporary relief. He stayed there for quite a few minutes before he'd recovered enough composure to get back into the car and ride to Reno. I stayed with him through the operation, and—one thing about Dick McLain, he was a big man, and he had a huge chest. And the doctor remarked, it took twice as much ether to put him out as it did the ordinary man. That is an operation which I would not want to have. I'm not going to explain about it, but I watched the process.

Richard had kind of a bad drinking habit and it gradually got worse, and he left the Highway Department. Later on, he came on back into Carson, and he worked at various jobs. For a while, he was custodian at the Carson hospital. I don't know just what happened to Dick—whether he's still alive or not.

The matter of obtaining good quality gravel, which is usable for excellent or good base course, or good quality surfacing course, and in some cases, good quality for concrete (this also applies to sand), the matter of obtaining those is extremely important, principally because of the money it saves the state and the federal government in building roads.

For example, we'll say there's a job approximately ten miles long. If we would simply design the job, and tell the contractor [to] find his own materials, he certainly is going to add something if he is a good contractor. He's going to add plenty for the uncertainty. Now, if he knows exactly where he can get those materials, and he knows quite accurately the quantity available in those places, then he can figure out his average haul, and he knows the cost of that, and he can bid accordingly. In order to get such gravel, you must have a person who understands what he's doing. He does not have to be a highly qualified geologist, although if the geologist has a good common sense about what he's looking for, in addition to his technical knowledge, that is fine. But, we just talked about R. C. McLain, and his ability to smell out good gravel. Well, I think Dick, in his time, must have saved the state many, many thousands of dollars. Seldom would he bring in material which was unsatisfactory. Of course, there are many other tests applied to the gravel. In the earlier gravels, we did not have tests which would thoroughly check out

quality. In later years we had that. But, when we built roads only eighteen to twenty feet wide with—for traffic of light weight, and not much of it, we probably could use less gravel and maybe a slightly inferior quality, which we could not do in later years without treating the gravel in some manner. What we would do on these jobs, the materials survey man, in the early days, and even the present time, would go out and do some preliminary prospecting, and occasionally, if he could not tell by personal examination in the field about the quality, he would send in some of those preliminary samples for check tests. If they seemed to be all right, he would go ahead and develop the gravel. He would develop the deposits, if he possibly could, on government-owned ground. In those days, before the advent of the Bureau of Land Management, we could get the gravel for free, on government ground. And since, about eighty-five to eighty-seven percent of the state of Nevada was on government ground, in most cases we were able to get it on government ground. There were a few places where we could not do that, near settlements like Las Vegas, or Reno, or Elko [where] most of the surrounding area was private. But, in those cases, it paid sometimes to get the gravel right near or on the job, and pay a royalty rather than taking a long haul.

For example, if a contractor figures [it] would cost him say, seven cents per yard-mile to haul the gravel, and the average haul is six or seven miles, it may be a lot cheaper to find the gravel right on the job where the average haul is only two miles, even though he pays a few cents royalty. That is a big job, and a very important job, from the standpoint of quality in the finished product, and from the standpoint of economics, [that is] what you can save. If you can save by finding lots of good gravel close to the job, and

the contractor knows it from the test hole data, which is given to him in the special provisions, just exactly where he can get it, then you're going to be able to build more road with a million dollars than you could possibly do without such knowledge being available to you.

Some of the people who worked in the laboratory for a short time, upon special work, should be mentioned. I'll mention here a man who worked in the laboratory for quite some time, a native of Dayton, Nevada. That's Silvio Mastrioanni—he was known as "Doc." I think that name came from the fact that at one time he thought he was going to be a doctor, and had started to study medicine. Doc worked for us for three or four years in the laboratory in the early thirties, and then left us to go with the state board of health. And as far as I know, he's still employed by the state board of health, unless he has retired.

There was another former employee of the laboratory, who was about in the same position. And that is Sigvard Nielsen, "Steve," as we called him. He worked in our laboratory for a short time, as a chemist in 1930s. And then he, too, went with the state board of health. He and Doc and others with the state board of health have had a job, part of which consisted [of] inspecting food dispensers. I suppose that would cover meat markets and vegetable markets, as well as eating places and hotels. And I think the state of Nevada is to be complimented by the way the state board of health has kept our food dispensing, especially prepared food, ready to eat, in the Grade A condition. If the restaurant owner or food dispenser does not have that Grade A sign, he's not going to stay in business very long in the state of Nevada.

Another man, whom I described previously, was John Flournoy. I mentioned his work in the laboratory when I was telling

about his Highway Department experiences. He did work in the laboratory for three or four years in the late thirties and early forties, principally in the oil lab. And I had him do some research with statistics, which I mentioned previously, in order to check the reliability of certain tests on asphalts.

Another man whom I'm going to mention is Fred Forbush. Fred Forbush was on the laboratory payroll, I am quite sure—he and two or three others, just prior to the World's Fair. I believe that was in Chicago, although I'm not sure. I think it was supposed to be held in 1936. And because there was no particular spot in the state, or no other spot I guess, which had a place where you could put an artisan to work, legally or otherwise, they put them in the laboratory, on the laboratory payroll. And they used the back end of our laboratory to do certain things of an artistic nature, which would result in oil exhibits for the World's Fair. And Fred Forbush was one of such artisans. Fred was of part Indian descent. He has had an interesting career, and he's a highly interesting person. My first experience with him had to do with his carvings. He made some beautiful carvings from manzanita wood, and some of these have been on display at the World's Fair and I believe they're displayed in other places. He was a very fine artisan. Since that time, he's been employed by the Carson Indian School, and while thus employed, of course, he and his wife succeeded in educating their daughter. And Fred decided, he too, should have a college education. And over a period of probably as many as a dozen years, he managed to get a degree—I believe it was either an A.B. or B.S.—from the University of Nevada. While Fred was doing this, he also joined the Masonic Lodge, and he went into the several branches of Masonry, acted as a secretary in one branch, and I believe at the

present time he's a Shriner. He also served on the board of school trustees for Carson City for many years. And Fred, I think, is about ready to retire at the present time.

Another man, who should be mentioned at this time, is Andy Huhn. Andy Huhn also was hired as an artisan in the early thirties, getting ready for the World's Fair. And he prepared certain artifacts, and I believe he did some carvings and could make statuary, and he could take jewelry and convert it into beautiful specimens. I believe Andy worked for only a year or two at that, and later left Nevada, and went into Hawaii.

There is still another person, whom I must mention in that respect, and it was Frank Garaventa. He too, was employed, initially in the Highway Department as an artisan, getting things ready for the World's Fair. Frank was raised in Nevada, and I believe at Weeks, along the Carson River, was his home place. Frank had a very good knowledge of gem-type minerals. He knew where to find them, but he said it was not his policy to try to locate a mining claim, because if he located the source of some of these things, it would then become public knowledge, and people would have a tendency to go in and high grade the best. But, if he simply picked up the specimens that he wanted, without doing any location, it would not necessarily be known so widely.

A couple of areas Frank used considerably; I'm familiar with those. One such area was between Weeks on the Carson River and Wabuska. There's an area there about roughly five or six miles, southernly from Weeks, in which Frank found specimens of what he called alladinite. And some of them contained bloodstone. I think that particular area is pretty well known now to rock and mineral clubs people. Frank secured a number of beautiful specimens there, although the bloodstone was quite rare. The others are

flinty materials and have—the colors are green, and sort of dull red, but some of them are very beautiful. I have quite a few of those specimens myself, but no bloodstone.

Another area Frank was thoroughly familiar with, was the opal fields in northern Nevada. And he secured some very fine specimens from that field, and as a matter of fact, borrowed from other people quite a number of specimens for use in exhibiting at the World's Fair.

Then again, there are some fairly good agates in several places in Nevada. In particular, you can find what we call the "thunder eggs." I believe that is off of U.S. 40, to the south about twenty miles, or thirty miles, perhaps, east of Carlin; the geyser area at Beowawe is right in that vicinity. I, myself, have found a number of so-called thunder eggs there; if you crack some of them open, you'll find that they're quite highly agatized inside.

Frank Garaventa was kept on in the Highway Department, and worked in the laboratory for a while, and then he was transferred to the field as an inspector. He worked on several contracts as an inspector, and, until the time of his death. I believe he died about twenty years ago of a heart attack.

Gene Robens was born in Ohio and had his high school education there, and, who came to Nevada as a member of the CCC corps [Civilian Conservation Corps], was hired during Robert Allen's administration as an office man in the laboratory. Gene could do a fairly good job of typing, although he did not take shorthand. Gene's father was noted as a professional ruin runner between Canada and some place in Ohio. Gene made no bones about discussing that. Gene has a brother, Bob, who also came to Nevada, and worked various jobs here, and finally went through the University of Nevada. Gene had been a very

good football end in his high school career, and his coach was brought to Nevada, mainly through the efforts of Gene, and he coached and secured a semiprofessional football team at the University of Nevada. Nevada had a big year or two. I can't think of the coach's name now [Coach Aiken], but, he was the one who brought this big football team into Nevada, and they won quite a number of games, but I think there was some objection to the methods used in securing the players and taking care of them.

Gene rented a small place from us. He was married, had one child. I helped him get into the National Guard, just prior to World War II. Gene went right up and was soon made second lieutenant, in World War II, and went right on up to captain, up to major, finally to colonel, and ended up as a general. And he had only a high school education. He was to have been on Eisenhower's staff, but I believe he became ill just before that happened. But, he did spend a lot of time in the European field, during war. And he came back to this country and was stationed, I believe, as commanding officer in some military camp. I do not know everything there is to know about him.

Johnny Curtis was one of the earlier employees. He came into the laboratory, I think, about 1940, soon after one of the legislative sessions. I do not know about John's place of birth, nor much about his schooling. John had a handicap which would be extreme to most people. He had lost his right arm. He came to us as an ex-legislator, I believe, probably in either 1937 or 1940. He could do certain tasks in the laboratory with that one hand. But he became extra proficient with that left hand, in determining the Atterberg limits, that is, the liquid limit and plastic limit. If a material were plastic, it would involve rolling it out to a thread one-eighth

inch in diameter, and continuing the rolling until it was dry enough, dried enough until it would break up. The moisture content at that point, would be called the plastic limit. John was very proficient in that, and we kept him at that through most of his career. He could also do screening and other things. In addition, on the side, John was an excellent mechanic, and he worked on cars, privately, in his spare time, for a good many people. However, unfortunately, he had a very bad drinking habit, something he could not control. He really let John Barleycorn get the best of him. He worked for us about ten years, I believe. He had been absent, along about the last year of his work with us; he'd been absent for quite a while. I found him at his abode almost unconscious, and I doubt if he had had anything to eat for an extended period. I got him up to the hospital. They put him in. He should have been fed intravenously. I do not know too much about medicine, but I knew he needed food. But, he did not get it. The next day he died. I helped his sister, who came from Lovelock, with the funeral arrangements. But John was an expert in that one particular field, and he—for a period of almost ten years, he took care of that end of the testing.

I now must tell about a very interesting person, who came to us as an employee during Bob Allen's administration—Carl Gottschalk. Carl was born in Bozeman,—Montana, of German parentage. At least his father was a native of Germany, but had come to the United States as a young man, liked the open spaces of the West and settled in Montana, and I believe became a citizen. He was married there, and that is where Carl was born.

Carl's home was not too far from the area of Custer's last stand, the battle of Little Big Horn. This was a battle of extreme interest to Carl, and he had gathered factual anecdotes, and writings. In fact, he'd collected copious

notes regarding this battle, and he told me he had the intention to compile them into a historical story of the battle. He contended that the hero implication histories [that] have [been] attributed to Custer be altered to portray the true picture—one of abject stupidity of a U.S. general, a general who failed to properly scout the enemy, and to obtain intelligence of his strength and probable intent, and who also failed to make a preliminary study of the geographical contours of the prospective battleground.

Carl received grade school and high school education in Bozeman, and graduated from Montana State College. He later obtained a master's degree at the University of Wisconsin. He also continued studies at the University of Minnesota, and at Johns Hopkins in Baltimore, Maryland. I remember Carl telling about he, a Montanan, accustomed to cold, fairly dry weather. Here he was attending Johns Hopkins in Baltimore, Maryland where the heat and humidity both were excessive. He did his studying in the bathtub filled with cool water. He did not finish his Ph.D. Carl was a teacher of chemistry at North Dakota Cultural College, and I believe he taught some at the University of Minnesota. He, and his wife, Ella, and daughter [Carol] came to Reno, Nevada in 1942. He was given a job as chemist in the testing department, by Robert Allen, in 1942. Carl was an excellent chemist, very fussy about accuracy, and did not take too kindly about having helpers. He and Norman Noteware did not get along too well. So, we transferred Norman to work on the special asphalt tests. I believe this had something to do with Norman's nervousness, which caused him to temporarily give up highway work.

Carl was an excellent fly tier, that is, trout flies. He told about the fine fishing he obtained in the Gallatin and Madison rivers in Montana, and about using his own flies.

The natural fly on the water up there were a type of salmon fly. Carl made almost perfect replicas of flies to do his fishing. And he'd know just when the fish would strike, and he worked accordingly. He said he used a fishing basket about twice as long as the ordinary fish basket, because he would catch the big boys. He made a number of these salmon flies, and others also, and gave quite a few of those to Hal Kispert and to me, the both of us being fly fishermen.

During Bob Allen's administration, quite a study was made of the Carson River water; and samples from the headwaters of the Carson River and all along the stream at various places and from Lahontan itself were taken for quite a period of time. This project, I think, had something to do with what the attorney [George] Sanford, of Carson City, was mixed up in, and Bob Allen said he would cooperate with him. It probably had something to do with the eventual construction of the Watahameau Dam. Carl took extra pains in taking these samples. By the way, we were assigned to get some of the samples from Lahontan from time to time, and incidentally, some of the boys discovered a winter sheep pasturage alongside the road, and although they were using a state truck and state time to do this, I recall that a good many sacks of very fine sheep fertilizer were brought in from that particular area.

Carl was very much interested in Nevada minerals and ores, and had gathered quite a valuable collection of Comstock ore samples and some from other places, wherever he could obtain the material. He did quite a lot of exploring around old mining camps such as Bodie and Aurora and Virginia and Silver City. And he hiked into the Sierras, looking for various specimens. He was bothered by circulatory trouble, and one time when he was prospecting on Slide Mountain, a clot of blood

gathered in one of his legs, and eventually he had to have that leg removed. And when he recovered from it, he came back to work for quite a little while. But, the circulatory trouble continued, and finally he was forced to have the other leg removed, and of course, could no longer work.

There's one little item, I think we should mention at this time. Carl was a very thorough chemist, and he made use of his reagents sparingly. One of the reagents which was necessary in a chemical laboratory is pure grain alcohol without adulterants, without being treated. As a state, we were able to buy the alcohol, five gallons at a time, at little more than cost. Actually, believe it or not, it cost us ninety cents a gallon plus for a 190 proof alcohol, ninetyfive percent. That is a very fine reagent particularly in certain organic chemical determinations. This was rather peculiar. The inspectors came two at a time, about twice a year, to Carson City from San Francisco to inspect that five gallons of alcohol, to see that it was being used properly. Carl noticed, after he'd been here for a while, that the supply of alcohol seemed to be depleted now and then. He also noticed, on one of his desks, there was some stains of something like 7-Up or something of the kind. So, of course, it was no doubt the fault of someone who had a key (partners, too), who got into there at night. Carl was very angry about this, and he reported to Mr. Allen. Mr. Allen immediately caused the alcohol situation to be discontinued, and we'd have to use some other reagent.

Carl loved the outdoors, in the mineral collection. And he was very fond of opera. He would listen to opera every Saturday afternoon on the radio. He passed away in 1958. And while he was not exactly an agnostic, his beliefs tended that way. There was no religious ceremony at his funeral.

But selections from his favorite operas were played. Mrs. Gottschalk saw to that. His wife, Ella, still lives in Reno. She is eighty years old at this time, 1973. And she's been quite prominent in musical and other cultural affairs of Reno. And, by the way, she was the composer of the historical pageant displayed on the state capitol grounds, on the first Admission Day, which celebrated the seventy-fifth anniversary of Nevada as a state. That was held in 1938.

Well, here we are again [November 17, 1975] after two and a half years, ready to continue this so-called autobiography of the speaker. The last meeting we had is—if my records are correct, was April 26, 1973. In the meantime, I became busy as an inspector here and there, and was unable to take the time, or at least did not take the time to do any more. But, here we are and ready to go again, and in a way, it was a good thing, because things have happened to some people, which have made a great difference in their lives—people of whom I'm going to speak—and their lives have made some importance in history. So, let's assume it's a good thing we waited.

I would like to talk about James Sullivan at this time. Jim was born in Reno in 1916, and he attended grade school and high school there, and he graduated from the University of Nevada with a Bachelor of Science degree in 1940. His father was for many years, a doctor in Reno, and quite a noted doctor as I recall. Jim, of course, later was married, and he has, I believe, it's three, perhaps four children. It may be four. I'm not sure of that.

Jim went to work for the Highway Department after college and spent about six months in the field as a chainman. And, then he transferred into the laboratory, and started working in the asphalt lab until 1943, when he went into the service in World War

II as an infantryman. Jim spent three years in the service in the European theater, and came out as technical sergeant. He returned to the Highway laboratory in June 1946, but was able to stay only until about December of that year. His uncle had passed away, and Jim took over the uncle's tobacco shop business on Virginia Street in Reno. He held that shop for about four and a half years, and then came back to the lab, and was placed in charge of the asphalt laboratory as senior physical testing engineer.

Jim served about three years in that capacity, and the personnel increased, the work increased, and in fact, highway business increased all over the state, and I needed an assistant. And, upon my recommendation, Jim was made assistant testing engineer, that is, my chief assistant, a job he held from about 1954, and he still holds it at the present time, 1975. Jim was placed in charge of all the duties in connection with lab equipment and supplies and purchases and maintenance, and handled conferences with equipment people, and other people. He also handled much of the correspondence in checking of test reports and was always present at the usual conferences among the highway engineers. And Jim, also, attended the annual highway conference. He was a great help to me in handling all of this. And, of course, he was also in charge of the laboratory in my absence. And he was very familiar with all the functions of the laboratory. And as a matter of fact, he helped organize and arrange the new laboratory, into which we moved in October 1964. He took responsibility of moving all the equipment from the building up next to the capitol grounds. And it just so happened, I was away attending a conference in Washington, so I got out of that moving job, came back, and Jim had it all finished.

As time went on and growth continued, I had to give up some of the duties I was

doing, such as establishing roadbed design on the basis of our numerous soil tests, and tests of quality of various aggregates for each particular job, and also based upon prognostication of traffic loads fifteen years ahead of time, which information was furnished to us by the planning department of which Orvis Riel was in charge. Jim took over my job, in that respect, besides doing some of his other jobs. And, at that time it became apparent that we would have to get some help. So it was necessary to advertise for a soils engineer.

As time went on, of course, it was time for me to retire, and there were several people in our state Highway Department, who would like to have had my job. Jim was one. And, we had hired a soils engineer, Don Collins, and he also would like to have had the job. And a meeting was held, and a conference was held with these various applicants, and I refused to be on that board because three of the fellows who had worked for me so long were applying. And one outsider came, Mr. Jim Desmond, who had been the chief materials engineer in the Wyoming Highway Department for many years. Something happened in his family which was extremely disconcerting to both Jim and his wife. They lost one of their boys in a motorcycle accident right near their house, and Mrs. Desmond could no longer live there. So Jim thought he would try his luck on this Nevada job. And the board in charge, after interviewing the various applicants, decided on Jim Desmond. I was, in a way, disappointed, of course, that Jim Sullivan did not take it. But, I assume the board knew the situation. And Jim Desmond, as a matter of fact, had a world of experience and very broad experience.

Jim has been very active in some community affairs. As a matter of fact, he was very active in the Knights of Columbus.

And as I recall, he was a state head of that organization for a while. But, Jim was always looking out for me. And I owe him thanks, because he took the responsibility for arranging the name of that street, Little Lane, in front of the laboratory and saw to it that the signs were put up. At the present time, Jim has had more than enough years to retire, but he would like to stay on at least two more years until his youngest son finishes the University.

Another valuable employee, I must tell about, is Hal Kispert. Hal is an individual with a varied and very interesting career and life history. He was born in Big Pine, California, July 24, 1924. He finished his high school and grade school in Big Pine. And he and his father were very familiar with the topography of the Owens valley in the Sierra ranges. As a matter of fact, I was a contemporary of Hal. I was going to Bishop High School while he was going to Big Pine High School, but it so happens we never got to know each other in those days.

Hal and his father, when they had the time, did a lot of fishing in the summer up in the Owens Valley, and on the upper Owens River in Long Valley. That was long before the lake was established there and, of course, before Los Angeles took over the water systems. He used to tell me about the huge trout they caught there. I knew something about it because I had been there myself while I was going to high school. My uncle, Charles Peake, was quite a fisherman, and we had done some fishing in the Long Valley, but according to Hal's story, they got bigger ones than we did.

Hal decided that he'd like to be a pharmacist, and after he graduated from high school, he went to [the] university of Southern California and graduated in 1928 with a Bachelor of Science degree in pharmacy. While in college, he was on the first Trojan

track team in 1926, and he participated in both the 220 and 440 races. He was also president of his senior class, and was a member of the Skull and Dagger, and was selected as one of the outstanding men [on] campus. He was also the first president of the Masonic Club of the college. But after graduation, he soon found that pharmacists were poorly paid, so poorly in fact, that he thought he should establish a business of his own. That he did was establish what he called a "Hollywood" catering and renting of party equipment. He continued this very successfully until 1934, at which time he moved to Fallon, where his father had moved from Bishop, and invested, along with his father, in a ranch in the Shackler district. While in Fallon, he became president of the local farm bureau, and he was active in Boy Scouts and 4-H Club work. He also served one term in the Nevada state assembly.

In 1941, he enlisted in the Navy and served in the Hospital Corps as a pharmacist, but was placed on active duty with the second and third Marine divisions on Guadalcanal and Bougainville in the Solomon Islands campaign. And he narrowly missed being killed by Japanese shelling and can tell some interesting accounts of his experiences there. Upon completion of his active duty, he continued in the Naval Reserve here in Reno until retirement from that organization after twenty-three years. Of course, in the meantime, he came into the Highway Department. He was in the Highway Department for six months and learned about the testing department, which was more the nature of his training. He then transferred to the laboratory, and he served in the concrete laboratory as head of the department, and retired in 1966.

Hal has been very active in the branches of Masonry. And he became head of the Ed Peterson Commandery of the Knights

Templar. While there, he received a rarely awarded honor of the Knights Templar. It had to do with eye foundation. I'm not familiar with just what the award consisted of, but he does have a plague of some kind. During his retirement, he had some trouble with his legs, and that took some time to get those repaired, but he's again able to walk around on the fishing streams, and he had done a lot of fishing. In fact, he has a camper, and he and his wife have traveled in a lot of the United States. I told him about the good fishing in the Gunnison country where I used to live in Colorado. He made one trip there, and became acquainted with quite a few of my friends, and had some wonderful fishing. He's also fished and hunted in various states in the northwestern United States, and he's been up into Canada.

Another young man whom I must mention, is Bob Maher. I believe Bob was a native from Nevada, but I'm not sure of that. He attended the University of Nevada, but did not graduate. He came into our laboratory (the old laboratory, west of the capitol), but I've forgotten the year. He was there with us for about two years, but about that time, of course, World War II was on, and Bob enlisted in the Marines. He took part, while in the service, in some of the toughest battles in the Pacific, among which were on the islands [of] the Saipan and the Tinian. He returned from the war with a lieutenant's commission. And he was again employed by the Highway Department, but this time he went into the field on inspection work and as surveyor's assistant. Unfortunately, Bob was killed in an auto accident in a Highway Department vehicle shortly after he had been assigned to the field. Bob's sister, by the way, was secretary to Governor Pittman.

There's one man who worked in the Highway Department for a good many

years, and in the laboratory for a good part of that time, and his name was Milton Ross. We always called him "Red" Ross, and he was a redhead. Well Milton, or Red, as we called him, was born in Verdi. He attended schools in Verdi, Sparks, and Reno, and graduated from Reno High School. He spent considerable time in a CCC camp after high school, and then took miscellaneous jobs, any kind of laboring jobs he could get, until 1937, when he joined the Highway Department. He started out at the bottom, and went on up through several of the grades in engineering, starting in surveying, and he worked his way up to resident engineer. But before that time, he'd spent a considerable amount of his Highway career as a concrete and asphalt construction inspector. He was transferred to the materials and testing division in 1951, and was assigned as an all-around man for work in the fields conducting materials survey, and at other times, worked in the lab. His crew used backhoes and augers and other equipment, but the equipment which had been used previously was pretty badly worn, and Red insisted on getting new equipment. We saw to it that it was done. Red, himself, was an excellent handler of equipment. And sometimes in the winter, he was drafted by the maintenance men to help plough the heavy snows on the Clear Creek and Lake Tahoe grades.

Ross had two—I believe three children, a boy and two girls, and he had been married twice, and had lost both wives. And at the present time he lives on Valley View Drive, south of Carson City. He retired from the Highway Department in 1967.

There were other employees who worked in the laboratory for a short time, who went overseas in the war. I will not say too much about those, because they were in the laboratory such a short time before they went

into the service. One was Gray Mashburn, son of the attorney general. Another was George Hardman, Jr., son of George Hardman, who was with the [Soil Conservation Service]. Mashburn was an aviator in the Army, and he met with an accident in England while flying and was killed over there. George Hardman was a lieutenant, junior grade, in the air service of the Navy, and was lost in a storm in the South Pacific while leading a mission.

There are still others employed, in later years, who are in the service, and I may mention some of them, but will not go into too much detail.

I must now talk something about the need for the knowledge of geology in road building. It was evident, to a lot of us, that that need was always present. Frank Morrison, who was chief testing engineer preceding me, and I too, were both interested in [geology], and after a fashion we were would-be geologists. I think both of us had done quite a lot of studying, though, and we could understand a lot about geological situations which required special work in building highways. For example, certain areas where badly faulted, needed special work. And other areas where water or underground water might cause a problem, needed special work. I could mention a few. I recall, in building U.S. 395 through Carson City, the highway crosses over the main fault, which travels through Carson City from the south end to a northerly direction; then it crosses the main highway just above the Dutch Mill and travels on easterly for a ways, and then heads again off to the north. This particular area had given water trouble. Springs and water usually follow faults. So, when U.S. 50 was rebuilt, I made a quite thorough study of the situation, and found it necessary to dig deeper than had been intended in the first place, and place perforated, corrugated metal

pipe in a herringbone fashion, embedded in gravel, so we could pick up all that water. And that eliminated a trouble we had in that particular area.

We also, were assigned work (before there were professional engineers in the state, who did that kind of thing)—assigned to counties and cities as a courtesy of the state Highway Department, on special studies. For example, the Carson High School, which is now the junior high school, in the westerly part of town, had water problems there. As a matter of fact, they [had what I call a] young underground stream of water under that building, that needed treatment; and I was given the job as a courtesy to the Carson City school board, to make a correction, which was taken care of by proper drainage.

I got to the point where there were so many things to do in the testing lab and so much attention required to geological situations, that it was necessary to obtain a geologist. And therefore, advertisements were put out, and we checked on a good many people. We ended up hiring Tom Cordova. Tom was the first bona fide geologist hired in the department.

Tom Cordova has had an interesting career. At present he has a thriving business as I will describe briefly, later. Tom is of Basque descent and was raised in northern Elko County. He told me about his schools over the phone. He said his residence, when he was a young lad, was in the San Jacinto region of Elko County. And he attended public schools, first Contact, with ten students in the school, and later at Delaplain, which is really not a town, but just a dot on the landscape. There were only seven students in that school. Tom went through high school in Battle Mountain. He had an early interest in earth formations and geology, and thus, chose engineering geology as his major at the University of Nevada.

He came to work in the Highway Department laboratory as an engineering geologist, and became a valuable aid in special studies of geology along the various highway routes with geological problems. I recall one special assignment he had on the road between Fernley and the settlement presently called Silver Springs, where we had to penetrate a large lava flow. Tom had that one figured out very well, and it was built just according to the design he suggested.

Tom was so interested in geology, that he wanted to secure his master's degree. So I obtained permission from the Highway Department heads to allow him to spend part-time each week in the late 1962 and '63, to attend the university. And he obtained his master's degree in engineering geology in 1962, but soon after left the department to work with Clair Hill and Associates, a noted engineering firm. He worked with Clair Hill until 1970, and at that time, he established his own business, which is entitled Earth Science Consultants. He managed to obtain the necessary drilling and other exploratory equipment, and succeeded in obtaining foundation studies in a number of building projects, especially large buildings such as the Ormsby House in Carson City, and many others. The fact that Nevada began to boom, gave Tom a helping hand in this, so he increased his equipment, and he has moved from place to place in the Reno-Sparks-Carson City area, and has now become the proprietor of two businesses in addition to his exploration projects. He lives in Reno at present, and these two businesses are called Concore Drills Incorporated and the other, the Ducore Corporation. The latter has to do with coring and sawing of Portland cement concrete for checking its quality.

Tom is married, of course, and has four children, and the Cordova home is located

in Reno at present. He's a member of the National Society of Professional Engineering Geologists.

At that time Tom left us, we advertised again for a geologist, and a number of applicants gathered in the assigned place for questioning, and so forth. We ended up choosing a man by the name of Bert Replogle. Bert was born in Lewiston, Montana, and attended grade and high school there. He also attended the Montana School of Mines one year and spent three more years of his college career at [the] University of Montana. After graduating, he had quite a career in various organizations. He spent some time in the service in the U.S. Navy, air arm, and after which he joined the U.S.G.S. [United States Geological Survey]. And after working one and a half years for that organization, he changed into another organization, which was a small company, and worked there for one and a half years in geological studies. Later, he was with the United States Soil Conservation Service as an engineering technician. Then he spent another two-year hitch with the U.S. Forest Service in foundation work. He also worked in the highway department of the state of Washington three years as engineer-technician. He came into the Nevada Highway Department under the supervision, of course, of the testing engineer, as engineering geologist, grade II. And he has made geological studies, and with the help of an additional geologist or two, which were assigned after I left the Highway Department. He's still employed, and now in his tenth year in the Nevada Highway Department, and is now a geologist, grade III. Bert is married, and has two children.

Keith Layton, who is at present the assistant deputy Highway engineer (having to do with construction and maintenance of highways)—he was born in Shelby, Montana.

He had his grade school and high school work in Battle Mountain, Nevada. And he attended the University of Nevada, but did not graduate. He completed International Correspondence School in highway engineering during his early years in the Highway Department. He started out for the Highway Department in the field, and he advanced up the line to become a resident engineer, after several years. I worked with Keith as a resident engineer; that is, Keith was a resident engineer on some of the projects which I inspected from time to time, as testing engineer. In my judgment, Keith was an excellent engineer. He was made, in 1963, an assistant construction engineer, and then in 1967, was assigned as an assistant deputy Highway engineer.

As the department grew, the need for a soils specialist, or a soils engineer, was evident. It was not possible for the testing engineer and the assistant testing engineer, either singly or combined, to take care of all the soils studies needed, in addition to many other duties. Therefore, after advertising, and interviewing a number of applicants, Mr. Don Collins was chosen as the soils engineer. He started work April seventeenth of 1963, before we had moved into the new laboratory. Don came to us from Oregon, where he had been doing chemical work, principally, but had had experience in soils. He had his high school education in Salem, Oregon, and graduated from Willamette University, with a major in chemistry. He also completed some courses in baking management, at the Institute of Baking. He didn't say much to me about his experience in baking, but apparently he had some training. He completed in later years a soils mechanics course, given by Oregon State University of Salem. And during his Oregon residence, he also spent two years as a route salesman. I don't know what he was selling, but he did have that experience. His technical

experience, as it applied to highway work, consisted of two and a half years as chemist, and another three and a half years as materials and testing engineer in Oregon. He served in the United States Navy for three years and eight months.

After taking over the soils engineer job in our new lab, he was given quite a free rein. I had purposely left the purchase of and arrangement of equipment in the new soils lab to be taken care of by our soils engineer, whoever he might be. So, Don had the job. And he did a very good job in arranging that laboratory and getting the equipment he needed, including drying rooms adjacent to the lab, with appropriate ovens, and all the appurtenances necessary to do the tests we had been doing, and some new tests, which he would introduce. He took hold right well, but it took a little while for him to adjust to this new experience. However, he did a very good job and was soon fully well established as a soils engineer, and he was allowed to make recommendations for standard design, based upon the soil studies, and the traffic prognostication fifteen years in advance of the building of any particular project.

Don became assistant testing engineer later on, under James Desmond. At that time, two assistant testing engineers were necessary. Jim Sullivan, having kept his job, and Don Collins became the assistant under James Desmond. But Don retired in 1974.

I have omitted the name of many of our resident and division engineers. I find it not quite possible to do the kind of job I thought I should do, and cover the entire Highway Department. However, there are a few men, with whom I have worked quite closely, I would like to describe. Ace Howard is one. Ace Howard was, for many years, a resident engineer, and at that time he retired, he was assistant district engineer in the Reno district.

But, I think I'll tell a little more about Ace later on, because he and I acted as inspectors on some work north of Lake Tahoe, after we were both retired.

One man, who had done quite a lot in the Highway Department without very much formal training, is James Hodge. I must compliment James for the way he's advanced. He is at present the assistant testing engineer, and has taken Don Collins's place after quite a number of applicants (some with college degrees) had tried out for the job. Jim Hodge is a very conscientious person, and a very good worker.

At the time I left the laboratory, he was a materials and testing engineer II, and was in charge of the laboratory in which we checked the strength of various asphalt mixes. He handled that job very well. But, his early training, although not college caliber, was very good. He graduated at Sherman High School in West Virginia and served—I've forgotten just how many years—in World War II. And when he came to Nevada, he had taken two extension courses at the University, in auditing and business, also took auditing, I believe, at the Reno Business College. His experience before coming to the department consisted of some road building for the Air Force on the Islands and in Tokyo. And he had quite complete training in the Air Force in soils and aggregate. He also had some experience as professional welder on prefabricated metals and steel. He also had some experience in stake-out survey work and had inspected ready-mix, paving, batch plants, concrete plants; and he had considerable experience in the use of liquid asphalt. A lot of this work was done under the state Highway Department, while he was in the testing laboratory, which, of course, he did not have the training to fulfill. This became valuable to Jim, because of his knowledge,

rather complete, of the laboratory work—that knowledge helped him to obtain the job of assistant materials engineer.

At the present time, that job pays twenty-four thousand dollars, I believe, which is just about double the salary I had several years ago, as the chief testing engineer. However, we must think of these dollars as thirty-cent pieces nowadays, rather than dollars.. Jim is married and has one child, a girl, who is also married and lives in Carson City.

While I'm talking about laboratory employees and acquaintances, I must mention a man by the name of John Holley. John Holley worked for us only a very short time. But the reason I mention him now, is because he came from an area in New York state where my mother was raised. My mother was a Peake. And she had a number of cousins and relatives in southern New York, in that area, about a hundred miles out of New York City but on the Delaware River right near the Pennsylvania line. And John made trips, I believe two trips back East, while he was in the Highway Department. And he told some of my relatives about meeting me, and he brought back with him a Peake family history, dating from about 1872 up to the present time. I have a copy of that, and that part of it was very interesting.

John worked in materials survey section and prospected for gravel, but after a couple of years of that, he decided to go in business for himself, which he did, along U.S. Highway 50, in that particular area which has now been abandoned. So I really don't know what John is doing at the present time.

I am adding more people's names in this particular session, this date [November 25, 1975], because these are all people who worked for me and with me over the years, and some of them have done some very fine work. Some have been doing routine work

most of the time, but the work they did was important and it should be recorded. I'm going to talk about Jim Pomeroy. Jim was a Southerner; he was born in Texas, in Dangerfield, Texas as a matter of fact. But Jim is now, and has been for about fifteen years, in charge of the Las Vegas testing laboratory. He was in World War II, having enlisted in Texas, and he was married at the time he came here, and he had three children (I'm not sure whether they were all born before he came here or not), two girls and a boy. He began working in the Carson lab, as a laboratory apprentice in 1950 and was soon advanced to a lab assistant, and in 1954 was given the title junior physical testing engineer.

In September of 1958, the Las Vegas laboratory was established by W. O. Wright, when he was division engineer in Division One. Robert Arkell was placed in charge at that time, but left after a few years to take charge of the materials survey crew. Pomeroy was given charge of the Las Vegas lab; he seemed very anxious to go down there and take that job, and he was given the job. This lab, of course, was under direct supervision of the district engineer, but there were so many technical things with the lab that actually, the headquarters lab in Carson City had to act as a correlator and made trips down there off and on, just to check the procedure. There is usually two or sometimes three helpers in that particular laboratory. Pomeroy was advanced; in fact, he has had two advancements in the last seven years. He is now materials and testing engineer III. Work in that laboratory was pretty much limited to testing the kind of materials which should be tested right away and the heavier materials which cost a lot to ship. Concrete cylinders, for example, in that particular district were tested there, as were some of the tests on most asphaltic products and some soils, and also checks were made

on gradation of the various aggregates in District One. This work expedited obtaining of the results. It took so much time to ship samples from way down in the Vegas area to Carson, have the tests, take their turn in being performed, and getting the results back. It was a good thing to have this laboratory in Las Vegas, and Otis Wright must be given a lot of credit for seeing that one was built there. Now Jim has done very well down there during the past several years, but he has had domestic problems most of his life. I know that after his first wife divorced him here, he's had several wives, but as I am told, the last one (I don't know what the number is) has been with him now for about five years.

A man who did a very fine job for us in one of the physical testing laboratories was Paul Rubin, who is now retired. Paul Rubin came to us in 1950 and worked for the first few years as a lab technician, then was advanced to laboratory assistant, and about 1957 he was placed in charge of the roadbed aggregates laboratory. Then, again, it was shortly after 1960 or 1961 he was advanced in title to testing engineer, grade II. Paul was a conscientious worker with a congenial manner about him always. He and Jim Sullivan and Don Fletcher, all have resided in Reno, during their employment with the state Highway Department, and have commuted to Carson City, in all kinds of weather, taking weekly turns at furnishing transportation along with one or two other Reno-Carson commuters. Paul and Mrs. Rubin have two children, a son and a daughter, who in turn have two children each; thus they have four grandchildren. Paul has been active in Masonry, and Mrs. Rubin in Eastern Star. Paul is a member of Washoe Lodge Number 35, and was Master in 1959. He also is a member of the Scottish Rite and the Kerak Temple of the Shriners. Mrs. Rubin is past Matron of Eastern Star, and both she

and Paul are active in work with the Rainbow Girls. Their daughter was Worthy Advisor, and all three of the family have received, what is called the "Grand Cross of Color," which is quite an honor in Rainbow. Paul retired from the Highway Department in 1970. He keeps busy, however, with an agency, for janitorial supplies, representing the Paul Kress Supply Company.

A man, who was the son of an old-timer from the mining area north of Ely, Nevada, Don Fletcher, spent about eighteen years with the state Highway Department, principally in the testing laboratory, and he retired in 1968. Prior to 1950, he had spent thirteen years as a mechanic's helper, four years as a bus driver, and two years as a car serviceman. Don was married but had no children. He served three years in the Navy. He completed his public school training in Dayton, Nevada, and completed a special course in soils engineering at the University of Nevada. Don worked in the soils and roadbed aggregate section in the testing laboratory, and was expert in determining, what we call the Atterberg limits of soils and fine materials in the gravels. His rating was materials and testing engineer I, during his early years in the laboratory. After retiring, which was 1968, he moved [to] Rutland, British Columbia. He had always wanted to live up in there. I believe some of his relatives came from Canada.

Because of his proficiency in those tests, the Atterberg limits, Don spent a lot of his time training field testers in all the detailed procedures. These field testers were used in the Las Vegas and Elko and Reno laboratories, and some of them did part of the work in the field laboratories on the different jobs. Most of these people, particularly in the northern and central part of the state, would come in to the general Highway office in the wintertime to take special training. They kept on the payroll

that way and learned how to do quite a few things. Many of them came in to learn what the laboratory was all about, and actually were performing the tests. That's an old principle of education: you learn by doing. Don was very good in teaching these fellows— had lots of patience, and most of them were very attentive and learned a lot from him.

Richard Biggs came into the laboratory in the fall of 1958, and started as a junior aide trainee. Dick was born in Colorado, but his folks moved to California when he was a small boy. He finished grade school and high school in Plumas and Placer Counties, California. And he spent twelve years as a professional plumber and holds a journeyman plumber certificate; he also worked nine years as a miner. I just wonder sometimes when someone had the training as a plumber and was working as a plumber and can make nineteen dollars and fifty cents an hour, why they would take a lesser job [laughing]. But I guess the plumbing business has certain disadvantages. Dick was an ideal man because of that experience, to place in a new program which was insisted upon by the Bureau of Public Roads. His program was called the Record Sample Program, and what it consisted of was a resampling of finished products for check tests for quality, gradation, and so forth. As a matter of fact, we had been doing that on perhaps a minor scale for many years before the bureau insisted upon it. So, Dick was placed in charge of a considerable amount of that work, particularly in coring highway paving, both concrete and asphaltic paving. These cylinders would come in, the concrete for tests of compressive strength, and the asphaltic cores had to have the asphalt taken out with extracting solutions, the amount extracted determined, and sieve analysis made of the cleaned aggregates. Dick was furnished with the equipment he

needed, coring equipment and a vehicle to do this job, and was actually placed in charge of securing the samples for this particular program. However, before he'd gone out on the program, he had been working in the laboratory making some of the tests, and he was advanced to a lab technician and finally was advanced to materials and testing engineer I. Dick performed his duties in a completely satisfactory manner. Dick and Mrs. Biggs have two children, and at the present time, 1975, have three grandchildren.

Another man who has lived in Carson City for quite a number of years, Buck Eldridge, worked in the Highway Department out in the field before he came to the laboratory. His name is Gayus L. Eldridge, but everyone calls him "Buck" and I think his given name is known to very few. He was born in California and attended schools in that state. He graduated from Plumas County High School at Quincy, and attended San Jose State College one year, and spent one summer at Sacramento State. Buck and Mrs. Eldridge owned and operated the Capitol City Laundry in Carson city from 1939 to 1952. They have two children, and at the present time, 1975, two grandchildren. Buck started at the state Highway Department as a rodman and inspector in April 1952, after disposing of the laundry. He also did some field testing and was transferred to the headquarters laboratory in 1962, where he worked on several testing operations and he also assisted in keeping records. Buck had one physical disability: he was partly blinded. I think he is completely blind in one eye and had an operation for [a] cataract and uses glasses and a lens in the other. Mrs. Eldridge also works in the main Highway building as a receptionist. Both of these people plan to retire December 30, 1975. I was invited to the party just the other day.

Marshall Borgna, I believe he's of Basque descent. Marshall was born in Eureka, Nevada, and attended grade school and high there. He attended the University of Nevada for five semesters, majoring in history with a minor in language. That seems strange, a man majoring in those subjects working for the Highway Department, but that happens. He is, at present, in charge of the Highway Department materials survey, which is an important subdivision of the materials and testing division. Materials survey, of course, means prospecting for suitable aggregates and soils for preparing roadbed base and surface. This happened shortly [after] I left the department, but I was familiar with his previous work in District One in Las Vegas. Also happened after I left the department that the geological section was enlarged and all the geologists in the Highway Department were put in under the testing engineer. And the material survey crew work[s], sometimes, in conjunction with the geologist's crews. Marshall's crew shares at least five pieces of heavy equipment with the geologist's sections. Such equipment consists of three backhoes for gravel exploration and occasional use in geological exploration, and two drills used in studying foundations for design of highway structures. Also, this crew checks on soils and uses augers for obtaining soil samples. As we have always done, all the samples, when they're taken, have to have transmittal forms enclosed in the sample container, stating the location of the project and the location of the particular sample on the project, and the name of the person taking the sample. These data are important for future use. Marshall has five men working under him. As I have stated, his earlier Highway experience was all in District One in the Las Vegas area. He worked there as an inspector in a field tester and after nine years down there, he was

transferred to headquarters laboratory. He is at present materials and testing engineer II. He is married and has two children.

Robert A. Harker had quite a varied education; he is now retired. At the time he retired, in 1973, he had been for several years in charge of the bituminous mix design laboratory as materials and testing engineer II. He had worked for several years in that section while Jim Hodge was in charge. Bob's education, as I said, was quite diversified, and he also had diversified experiences before he came into the Highway Department. He had five years at the University of California and spent two and a half years in the U.S. Army. Earlier he had some time in Johns Hopkins Marine Station Junior College as a premed student. While he never became a doctor, he spent twelve and a half years as a chemist and eight years as a field service engineer, before he came to the Highway Department, of course. Bob is married and has two children.

Dudley Kline [Jr.], another employee—he is, I believe, a Nevada native. He attended grade and high school in Carson City and he attended the University of Nevada for three years, also attended for a short while Oregon State College. His major was science and minor was business. While in high school he became acquainted with the sampling and performing of field tests during the summers with the state Highway Department. He came into the main testing laboratory in 1962, and after doing miscellaneous tests for a while, he was transferred to the asphalt laboratory. He took some correspondence courses in asphalt paving and highway design, which helped him in this particular section. He was made chief of the asphalt testing laboratory about 1964, after we had moved to the new building, that is, the present laboratory. This position he still holds as materials and testing engineer II. He has three to five employees working under

him, depending upon the season of the year. Summer and early fall are the times when most of the asphalt samples come in from the field. Winter work and early spring work, sometimes is confined to special tests in the nature of research, although in the southern part of the state some of the asphalt paving continues. He is married and lives on the east shore of Lake Tahoe, in Douglas County. He, of course, has to commute from the Lake in all kinds of weather, but he uses a pickup with lots of power and snow tires and chains when necessary.

Fred DeSilva is an interesting man with an interesting past. At the present time, 1975, he is working in the headquarters laboratory as engineering technician IV, and is part of the geology personnel. He started in the lab in 1963, as assistant on materials survey. He operated heavy equipment in prospecting gravel sources, and for a while he was drill foreman, in charge of the actual prospecting operations. Later he was transferred to the laboratory after I left the organization. Fred is Portuguese, a graduate of Lisbon High School, and spent one year in Industrial College of Lisbon. He spent five years in construction as a road maintainer and pipe layer. I do not know whether that was done in this country or overseas. He stated to me that the most miserable time of his life was when he landed in New York City and had such a terrible time obtaining employment. He has obtained U.S. citizenship, is married, and for ten years was self-employed in Carson City and was owner of a laundry business. He sold the business just before joining the testing department.

Now John S. "Steve" Hancock. "Steve" as everybody calls him, came to the Highway [Department] as an engineering aide, and soon transferred to the testing laboratory in 1962. He was born in San Bernardino, California and moved to Fallon with his folks,

at an early age. He received grade school and high school educations in Fallon, then spent one year in Los Angeles Trade School. Before coming to the Highway Department, he was for a short time a school bus driver, and a service station attendant in Fallon. Steve became very proficient in the soils and foundation laboratory, and at the time I retired as chief testing engineer in December 1967, he was made materials testing engineer I. At the present time, [1975] he is in charge of the soils and foundation laboratory with the title materials and testing engineer II. Steve commuted from Fallon for a good many years. He tried it several ways; finally he settled on a motorcycle. But eventually he thought that was a little too far, so he moved to the Carson City area. He and his wife have three children.

Robert R. Weideman spent quite a number of years in the laboratory, but he had also spent more time in his originally adopted profession in mining, as a mining engineer and part owner and operator. Bob is a native of New York, having been born in Bismarck. His father was a mining man and moved about the country often so that Bob attended grade school in a number of locations all over the country. After graduation from high school at Chewelah, Washington, he continued with his higher education in several places, but at separate times over the years. He spent one year at [the] University of Washington in architectural engineering, then two years in Montana School of Mines. Later in life, he spent two years at what was called Tonopah Mining and Industrial School, studying mill design and testing of ores. Again later, he took corresponding schooling in accounting from La Salle Extension University and again followed that with the University of Nevada short courses in real estate appraisal, and in soil design and studies. Bob had seventeen years as a superintendent and

managing engineer in mining, and in 1955 he was one of the group which purchased the Dayton Consolidated Mine, just south of Silver City. Ore bodies were not worked by this particular organization, however. Nevertheless, according to Bob, the ore bodies are still available and potential producers. Certain purchasers, according to Bob, are considering taking over the mine, but a deal had not been completed. A few years ago a timbered shaft was completely burned out by vandals, which was, of course, detrimental to continuing work on the mine.

Prior to joining the Highway Department material section Bob spent about five years in real estate. He came into testing department in April 1962, and retired in 1973 and established an assay office in New Empire. He had so much business in this assay office that he had to give it up, so he sold that and now he's pretty well retired completely. He sold out in 1975. Bob handled special assignments in the laboratory office. He correlated materials survey data with specific planned construction, and he prepared the data for inclusion into the special provisions, which information on the test pits and the depths worked in prospecting enabled the contractors to closely estimate their costs. On the whole, this had the effect of saving money for the department. Of course, Bob was not the only one who had done this because it was a matter of policy, in the testing department, to do this kind of job almost ever since the Highway Department was formed. I think Nevada was one of the pioneers in doing this, principally because so much of the land was government owned and we could get on it without paying royalty. And most of our gravel sources, in times past, both common aggregates for surfacing and aggregates more specialized for concrete paving, were prospected and thoroughly tested before

these areas were designated. Bob retired as materials and testing engineer I. He is a member of the American Institute of Mining and Metallurgical Engineers. He is a member of the Carson City Rotary Club, and he has served in the local planning commission, an organization he chaired during a number of its recent busy years—a time of Carson City's phenomenal growth and its attendant flood of self-righteous real estate entrepreneurs.

I cannot help but interject a comment here, which I believe has valid poignancy. These real estate people who claim to represent the sole embodiment of progress have managed cleverly to hoodwink our governing bodies to the point of overdevelopment of our local semiarid environment. Available water in our Carson City area is limited. While exact figures for total available groundwater in the country are not available, the writer for thirty-nine and a half years was a member of the materials and testing department, part of the time the chief testing engineer. And this particular department was designated as the official United States Weather Bureau for Carson City—a nonpay job, of course. All of us took turns at time in getting maximum-minimum temperature readings and barometer readings and measuring precipitation and so forth. Now the average total precipitation for a year is just about ten inches here in Carson City—the urban area. And variation is quite severe certain years, from as little as about five and a half inches or just slightly more than that to as much as 20.41 inches. The latter amount was measured in the calendar year of 1940. True, that the east slope of a Sierra on its highest elevation to the valley floor receives considerably more water than the amount measured in urban Carson City due to heavier snowfall in the mountains. However, our east Sierra drainage slope area in the Ormsby-Carson limits is so small that

it is not possible to supply all water needs for a population of twenty-five thousand or more. Now, while the city has sunk a number of wells some of which give good flow at the present, the water table will be progressively lowered by continuous pumping. The average annual precipitation of ten inches in the valley with possibly twice as much (which has not been measured) in the Carson part of the Sierras, simply is not enough to guarantee needs in the future.

Thus far, negotiation [by] Carson City authorities for obtaining additional water from a proposed supply in Douglas County has not been successful and has very little chance of ever being successful. Douglas wants to make sure that they retain the water in their county. And the costs of necessary construction to obtain water from Marlette Lake are absolutely prohibitive. Present logical action would be to curtail all further real estate development. This action, of course, would curtail work for tradesmen such as carpenters, plasterers, plumbers, painters, and others; and it would result in an exodus of most of these semitransient workmen and a lot of the real estate salesmen—a condition which would affect land and business values. Thus the population growth would be reduced to a point that can be lived with until thinking people of persistence can create logical plans.

With reference to my remarks about real estate people, I do not mean to classify Robert Weideman with the professionals. Bob was at work as an agent, on a small scale, near the beginning of the big push, and his philosophy is quite different than the philosophy I have described.

At the end of the meeting of November twenty-fifth [1975], Mrs. Glass suggested that history investigators perusing these records [will] want to know why Fred DeSilva, a native of Portugal, would leave the New York

area and come to Nevada. I had not asked him his reason for such a move. Friday after Thanksgiving I contacted Fred DeSilva again at the Highway Department laboratory. This was rather a slow work day for lab employees as some Fridays after vacations are, and Fred was in a good mood to tell about his experiences in the U.S.A. Quite an audience of his fellow workers gathered around with open ears. It is necessary that I repeat some of the statements given by Fred when I formerly interviewed him. He was born in or near Lisbon, Portugal where he obtained his early schooling and graduated from Lisbon High School, after which he spent one year in the Industrial College at that city. Fred did not tell about his experiences in Portugal before he left there for the United States except to say that he had one son who is now living in France. Apparently, Fred's decision to leave his native land had to do with domestic or [marital] troubles. He arrived in Philadelphia in the late 1930s, and left soon for New York City, where after some discouraging attempts to find employment, he finally succeeded in securing a job as road maintainer. He worked in upstate New York and in New Jersey in concrete construction and pipe laying until about 1953, when he was again without work. A friend told him there surely would be work in San Francisco as he knew a man there who certainly would see that they both could get work.

The two of them, accordingly, left New York and arrived in the Bay Area in November of 1953, but decided to come to Reno, apparently for a brief outing, before checking on employment. Apparently, they drove over U.S. 50 and arrived in Carson City and stopped at the Silver Spur restaurant and casino for dinner. Fred said he never made it to Reno because of a most surprising circumstance. While at dinner he noticed

a slot machine mechanic with a familiar look. The mechanic was also struck by Fred's apparent familiarity. They spoke to each other. Fred DeSilva and Emil Marques were old schoolmates in Lisbon. Emil, when told Fred had come west seeking employment, immediately contacted the owner, and Fred was given a job on the spot. He worked two and a half years at the Spur then opened a laundromat in Carson City. He was married in the interim, and he and his wife operated the business for twelve years. Fred, however, became employed as an equipment operator in the gravel and soil exploration department of the testing laboratory in 1963, his wife remaining in charge of the laundry until it was sold two years later. Fred was transferred from field operations to the geology section of the laboratory about a year ago. He is now engineering technician IV. Fred is a naturalized American citizen, having received his papers a number of years ago.

I, from time to time, will go over records, and there are quite a few of the people who have not been in the Highway Department, or had not been there long at the time I was, [who] I am going to omit, because I have lost the records of them. But people who worked for a considerable time, or people who have become important since working even a short time I believe should have something said about them. I'm going to now [talk] about Howard Morgan.

Howard was born in El Paso, Texas and attended grade school in Alamogordo, [New Mexico]. As I recall, he was born in 1900 and is about the same age as I am. He was not married until late in life at which time he married a widow but had no children. Much of his adult life was spent as a laborer in mines and in mills. Before coming to the Highway Department, he had worked in Silver City, Nevada operating the Trimble mill. In

1940, he obtained employment on road construction work and maintenance with the state Highway Department. About 1946, he was transferred to the testing department and because of his experience in heavy equipment, he operated excavating equipment in the materials survey crew. He became head of the materials survey about 1956, a position he held 'til 1964, at which time he was transferred to the aggregates laboratory at headquarters on account of health problems. He retired in 1967, and died six years later on Father's Day 1973. Howard was active in Masonry and was a member of Carson Lodge Number One and also belonged to the Scottish Rite and to Kerak Temple of the Shrine. Both Howard and his wife, Juanita, were active in Eastern Star; he was Worthy Patron two terms, one of which he served when Juanita was Worthy Matron.

The different sections of the laboratory do different work. A chemical section—the nature of that work differs immensely from engineering sections, and I shall describe some of it later. The chemical laboratory, as a name referred to a part of the testing laboratory, [and] has been going for about fifty years, starting at first I believe under Bill Holcomb, who did a little of the chemical testing himself and later put Frank Morrison on as chemist. It has been important in highway construction because its functions, although the engineers are not familiar with them, mean a lot in quality of the final product—that is, the finished road with all its various parts including concrete, steel, reinforcing, steel structures, paints, asphaltic products of different kinds, various metals such as copper, and chrome, and others.

Budd Rude, who is now in charge of the chemical section and has been for the last thirteen and a half years, has, at present, two people working under him, Jim Crawford and Shirley Stevens, I call her; her name now,

though, is Dick. I knew her as Shirley Stevens. Both of these people will be referred to later.

Because of expansion of highway construction in the past several years which included greater use of metals, it became necessary to establish and equip a metallography laboratory in conjunction with the chemical laboratory. This all happened after I left the Highway Department, but it needs to be told about. This was done in 1971-1972 period by extending the lab building westerly from the chemical laboratory. At the same time the structural materials laboratory was extended westerly and had the new roof of that particular extension raised to accommodate a new five hundred thousand-pound testing machine to replace the old two hundred thousand-psi Rheile machine. The metallography lab was placed in charge of Budd Rude, a job for which he was eminently qualified. This new lab is directly connected to the chem lab with Budd's office adjoining the two. New and expensive equipment was required for the metallography section and as well as for the chemical laboratory, the new chemical equipment being designed to expedite analyses, thus replacing much of the old time-consuming wet analytical methods. Before I left the department we had purchased a new spectrograph in 1966. Later there were added a, gas chromatograph, a new super centrifuge capable of a maximum of twenty thousand revolutions per minute, and an infrared spectrophotometer. Upon completion of the metallography section, there were added a diamond saw, an abrasive cutoff saw, five polishing and grinding stations, a metallurgical specimen mounting machine, a Rockwell hardness tester, and a Charpy impact test. Budd assigned most of the chemical work to Shirley Stevens and Jim Crawford, but Crawford also assisted, occasionally, with some of the metallurgical

work. The metal testing was practically all done by Budd himself. From 1969 into 1973, Budd also was assigned an additional state job covering the north half of the state. This was done because of his experience and qualifications. The work consisted of special testing having to do with criminalistics (crime detection). Altogether Budd Rude had done a first-class job for the Highway Department and the state of Nevada. Budd is still rated as chemist II, a rating much lower than he deserves. I believe this is, in a large measure, due to the seemingly lack of understanding of professional engineers and personnel raters that the chemical and related metallurgical professions are at least as significant and valuable to society as is engineering.

Budd is a graduate of University High School. His college training was at Earlham College from which he graduated with a major in chemistry and minor in biology. I believe those schools are in California. He spent eleven years as a chemist, part of the time as owner and manager of an independent testing laboratory. This independent testing laboratory was located in the section of the old Carson City brewery in the southwest part of the building. He joined the Highway Department as chemist I in 1963, and he was later advanced as chief chemist with a rating as chemist II. He holds membership in the American Chemical Society, the American Society for Testing Materials, the American Society for Metals Testing, and the American Association for the Advancement of Science. He is presently married, after having previous marriages, and is the father of two living children; a third child, a son, was killed three years ago in an auto accident near Carson City.

James J. Crawford is now assistant in the chemical laboratory. He joined the testing department in 1963. He was a student at

the University of Nevada at Reno, majoring in chemistry. And although he completed four years of college work, a ruling of the University denied him a degree; to obtain a Bachelor of Science in chemistry, two years in a foreign language was required. Jim did not have the foreign language. Shortly after he came to work, I started suggesting to him that it was possible to secure his language credit by working on a part-time basis. I received permission from the state Highway engineer to make this offer to encourage advancement of ex-college people to complete a degree in order to obtain a better work classification. Jim finally decided to do this and attended the University of Nevada one day per week, under special arrangement with the University, until he obtained a full two years credit in German and obtained his Bachelor of Science in chemistry. The one day of pay, of course, was deducted from his paycheck. Although he had four years of chemistry there was no opening for him in the chemical end of the testing department in 1963. He was assigned to this soils and foundation laboratory and advanced through various grades until he became materials and testing engineer II. As work in (the) chemical laboratory increased, Jim was assigned there, but still with the title of engineer II. He is now assistant to Budd Rude in chemical and metallurgical testing. Presently (that is, 1975) he is involved in bridge deck corrosion studies. Jim is a native of White Pine County and finished precollege schooling in Ely. He is married and has two children.

I will now tell about Shirley Stevens, as I call her, as I knew her, in fact. Shirley [Stevens], who is now Shirley Dick, having been divorced and remarried during the past year, 1975, started working in the soils laboratory in September 1963. She was born in California in the Los Angeles area and

attended grade and high school there. She attended UCLA for two semesters majoring in chemistry. Then she worked three years as a lab assistant, nine months as a draftsman, and ten months as a waitress. She moved to Nevada in 1960, but did not work until 1963, as already stated. Shirley started in the laboratory as an engineer trainee, but was found to be so systematically adaptable to the soils testing, especially in performing the Atterberg tests, that she was soon made MTT technician I (that's materials and testing technician I). Because she had some experience in chemical laboratory work, she was transferred in 1965 to Budd Rude's department shortly after moving into the new testing laboratory building. Shirley was very efficient in each of her assignments and was advanced to materials and testing technician II. After some of home study Shirley passed the examination qualifying her for materials and testing engineer I, a title she has held since 1968. She does a large part of the chemical testing at the present time. Shirley has a pleasing personality and makes friends easily. She is a mother of two children, also the grandmother of two. She and her new husband Randy Dick plan to take up commercial fishing, after Shirley retires, early in 1976. Randy has constructed a fishing boat large enough to do what work they intend to do, and they will move it in 1976 to suitable fishing waters, wherever that may be.

Next I must mention some more of the women who have worked in the Highway Department laboratory. Earlier I had mentioned the fact that Mary Rochon worked there. Credit must be given to a most affable and efficient group of women in the lab office. They're hard to beat for efficiency and affability in all their duties. I'm talking now about the people who worked under me. These duties—such as receptionist, handling of lab intercom

system and outside calls, dictation, typing, handling of voluminous files relating to test records, and correspondence of preliminary work done prior to contracting projects, and records of tests and correspondence during the life of each individual contract. Other test records such as those applying to highway maintenance and records of research project and the daily weather data and personnel records added to the volume of this work. In referring to the women in the office staff I am limiting my remarks to periods from about 1958 to 1967. Prior to that time, we had but a single secretarytypist in the office, aided at times by [a] high school student trainee. These office women, who are regular employees, seldom stayed on the job more than a few years, at the most. I don't believe I shall try to describe all of these employees. The advent of freeway construction with attendant increase in all phases of highway activities required additional help, so we had in the office doing just the office work three employees. Now I'm going to talk about Marie Russell as I knew her; she is now Marie Shane.

Marie Shane, formerly Marie Russell, came to us first in 1958, as a clerk typist. She was the first of the three "grand ladies," I call them, who did so much to help our office functioning so well from the late fifties 'til my retirement in 1968. The other two were Barbara Bybee (I knew as Barbara Hess) and Dorothy Bell. As a matter of fact, Marie and Barbara are still there in the laboratory, 1975. Dorothy moved to Washington state in 1967 but returned to Carson in 1974 and managed to get employed within the Highway Department, but not in the testing department because offices were filled. She is presently employed in the state Highway planning department. She started work in January 1975. I'll tell more about Dorothy later.

Turning to Marie, I have never known another person capable of keeping such pleasant demeanor, composure, and optimistic outlook on life in the midst of a multitude of family problems, problems to most individuals would seem insoluble and leading them into a morass of pessimistic misery. I have never heard her utter a cross word, nor a derogatory remark about people, her own, or those of opposing views. At the same time, she was doing a remarkable job as head of our office staff. Marie is the mother of seven children, from ages two to twenty-two in the period previously mentioned. Her husband, John [Russell], was a laborer with jobs off and on and was in poor health. Managing the family and home responsibilities were entirely hers. The Russells lived in Washoe Valley on the west side of the highway about one mile from Washoe Summit. I believe Marie's composure under these circumstances of life was due to very large measure to her religious faith. She is a devout Catholic, and she has seen to it that her children were raised in the faith. Marie was born in Tarrytown, New York, but her folks moved to California, where she grew up and attended Catholic grade and high schools, and she graduated with a major in chemistry and minor in biology from Immaculate Heart College. She was married to John Russell in 1946 and their family consisted of one girl and six boys. John was very ill the last two years of his life and passed away in 1971. At the present time, 1975, Marie is still in charge of the lab office and has the title administrative secretary II. What has happened to Marie during the last four years must have been the result of divine gratitude. I believe it was late in 1971 or early 1972, she was courted by Tony Shane, a widower, and they were married.

Tony is right-of-way agent for utilities in the Nevada state Highway Department; he also is an expert to the point of artistry

as a carpenter and home builder. He has rebuilt the Washoe Valley home with as many as a dozen rooms, each one beautifully, appropriately, and artistically arranged and decorated. Mrs. Little and I were privileged to attend an open house, early this fall, given by Marie and Tony, which included many from the testing lab, and all in attendance marveled at the new home. Tony also has children, some of whom were present. Marie and Tony are a very happy couple.

I must continue my story about the three fine ladies I had in the office. Barbara Hess, was one of them; she is now known as Barbara Bybee, having divorced her husband. Barbara was one of those three affable and efficient women whom I have previously mentioned. She is now, of course, a single woman and goes by the name of Barbara Bybee, and she came into the testing department in October 1963, as senior clerk typist, and was advanced to principal clerk typist in October 1967. Barbara shares duties as receptionist and operator of the intercom with other girls in the office, but has charge of laboratory personnel and payroll records; also, she does special typing and classifying work on contracts. She is always cheerful and helpful to all who come to her for information. Barbara has no children of her own, but she thinks the world of her two stepchildren, the Hess boys. Those boys have graduated from the University of Nevada, and I have an idea that Barbara helped them along quite considerably. Her husband, Mr. Hess, was a mining man of the prospector type, more or less, and I personally doubt whether he contributed too much to the education of his boys. But one of his boys is now coach, at the north end of the Lake, at Incline, and the other one is an engineer who is now working with Walter Reid, a noted professional engineer in northern Nevada. Barbara graduated from

Sacramento Senior High School and has had extra training in shorthand. Before coming to the Highway Department, she worked for eight years as a supervisor and trainer for the Pacific Telephone Company and spent several years in general office work and bookkeeping. She also managed a motel for one year.

I must now mention Dorothy Bell. Dorothy, the third member of my triumvirate of fine office ladies, is a native of Kentucky. She attended public schools and high schools in Louisville and in Chicago. She is married and is the mother of three boys. She started in the laboratory office as file clerk in 1962 [and] was soon advanced to senior clerk. After special study in shorthand, she was given the title principal stenographer. She was second in command of the office staff and took over in Marie's absence. She served in several duties in the office, as whatever the occasion might demand. She was familiar with the files and could handle intercom and was an excellent receptionist. Dorothy was a fine looking woman, always dressed appropriately, and while she [presented] a mannerism sometimes of somewhat reserved dignity, she was always very polite and courteous. Dorothy and her husband left Carson City in 1967 and moved to the state of Washington, where she and her husband were employed six years, then returned to Carson City. At the present time, 1975, Dorothy is again employed in the state Highway Department, but this time in the planning department.

Dennis Mercer is a department head at the present time. Dennis is a California native, having been born in San Bernardino. His folks moved to Nevada after he had finished second grade. He attended third and fourth grades in Lovelock, after which his folks moved to Fallon, where he finished grade school and high school. He attended the University of Nevada at Reno for about one and a half years,

majoring in commercial art. He spent one year as a truck driver and a year and a half as an apprentice carpenter.

Dennis started in 1964 with the state Highway Department as an engineering aide on a survey crew. He transferred to the testing laboratory after a short time and worked in the roadbed aggregates laboratory as an engineering aide I, and gradually advanced in that section until he is now, in 1975, in charge; his title is materials and testing engineer II. He is a very good artist and is especially adept at reproducing sketches made by others and can do very good cartoons. I really believe he could have made a living doing art work. Mrs. Little had him enlarge a portion of a Lew Hymers "Seen About Town" cartoon, which contained my likeness and presented it to me as a present. Lew Hymers was a western Nevada artist, cartoonist, who did sketches for some of the newspapers. He lived in Genoa, as I recall. Dennis is married and has three children. He commuted all the way from Fallon for a number of years, but now lives in Carson City.

I must mention Cedric Nelson. Cedric C. Nelson is a local resident, was born here and went through grade and high school in Carson. He served two years in the Army, and his work experiences before joining the testing department consisted of ten years as a drill operator, and he had two years as meter patrolman on the streets. And after attending Maag's school of real estate in Reno, he worked one and a half years as a real estate broker-salesman, but he did not do too well in that particular job. Mrs. Little and I both talked to him and convinced him he should get into something else. He started in the laboratory as engineering aide trainee in the bituminous mix design section, under Jim Hodge. He advanced through several classifications during the past eight and a

half years and is now materials and testing engineer I in the bituminous mix designs section. He is married and has four children.

John A. Montrose, "Jack." "Jack," as we called him, was graduated from Churchill County High School, in Fallon, and attended the University of Nevada one year, intending to major in civil engineering. He also took special studies later in slope stability, soils investigation, and higher mathematics. He is married and has two boys. He spent two years in the United States Army. He started with the state Highway Department in 1964 as an engineering aide trainee, and worked one year as a stake puncher, and another year as a chainman. He transferred to the laboratory in March 1966 as testing technician I, specializing in cement-treated base testing. He advanced through ratings and is now materials and testing engineer II, and is in the geology section of the laboratory specializing in soils mechanics. Jack is a member of the Nevada Society of Professional Engineers, and president of the Sierra Range chapter of the Nevada Employees Association.

We've had a number of boys from Fallon, in the laboratory over the years. Ronald Wadsworth is one. Ronald, or "Mike" as we call him, is a native of Fallon and finished grade school and high school there. He worked as a laborer, a service station attendant for a while, then joined the Army and served in Germany for two years. He became employed in the testing laboratory September 1955, as an engineering aide trainee. He worked in several areas in the testing laboratory, and finally was assigned permanently to the asphalt section. He is now assistant there to Dudley Kline, who is the chief. Mike has a rating of materials and testing engineer I. His first marriage ended in divorce and he had five children by that marriage. He is married again to a widow with three children. That gives him quite a

number of children and stepchildren. Mike is a member of the Carson City's Elks Lodge.

Ronald Burgess another Fallon native, finished grade and high school there in Fallon and took correspondence courses in mechanical drawing and design. His work experiences before coming to the state Highway Department were school bus driver, service station attendant, and a construction laborer. His initial work for the Highway Department was in the field as engineering aide I. He worked in the Reno field laboratory for two years and took training while there in sand equivalent and cement-treated base testing.

Mentioning cement-treated base, I should make some remark about that. It's a type of construction which came into being after many years of highway building over roads which had some clay in them or some deleterious materials. By adding a small amount of cement, maybe as little as one and a half percent, but not more than two percent, to some of these soils, they are converted into what we call cement-treated base, and they do have some structural strength, although they are not like concrete. But by having the soil treated that way, it eliminates the possibility of destruction of the roadbed in wet weather by the clays giving away under high loads, and (there] has been quite a little testing in that field and research, and it is used extensively throughout the West and I believe throughout the country. Sometimes pure sands, when you have nothing else but pure sands, which are not plastic and have no bad clay, they still can be improved considerably by adding a small amount [of] cement to them. Sand is usually most stable when it is wet. It is never stable when it's dry, but by adding cement it can be made into fairly good subbase.

Now, back to Ron. He transferred to headquarters testing laboratory in 1966, as

a materials and testing technician II, and for two years was in the so-called record sampling program. That is a program insisted upon by Bureau of Public Roads, where frequent sampling of the finished roadbed aggregates and concrete aggregates were secured for further final checking of gradation and quality. As a matter of fact, we in Nevada were doing that to a large degree before the bureau insisted on increasing the number of samples that we took. Ron next was transferred to the asphalt laboratory, where he remained for about three years, after which, for about one and a half years he had charge of the materials survey prospecting crew—that is, the crew that goes out and prospects for gravels and sand. Because of health reasons, he was then transferred to Jim Hodge's section inside the laboratory. Jim placed him in charge of preliminary arrangements to secure permission to prospect for gravel and sand on federal lands. Bureaucratic officialdom, such as the Bureau of Land Management and the Forest Service control these lands, and the Bureau of Public Roads attached quite [some] significance to those bureaus and also attach[ed] importance to the government Bureau of Strategic Use of Materials and, of course, to interference with environment which must be considered before the Highway Department can even prospect let alone use the materials. Ron says he is lucky if he can get permission for the prospecting crew to move into a given area in time to do the job for pending construction. His programming is arranged so that hopefully permission to prospect may be obtained from three months to a year ahead of contracting a project. This involves a lot of correspondence as well as conferences and meetings. Better described as superfluous red tape as far as I'm concerned. Ron with his wife and family have three children, live at the east side of the Carson

River in the Pine Nut Hills area. His official title is materials and testing engineer I.

Now I should mention Donald Stone or "Jack" Stone, as we call him. He is a native of Idaho, but his parents moved to Elko County, where he graduated from Carlin High School. He served almost six years in the Air Force. He took some technical training; he took two years of technical math courses, and surveying, and inspection and testing, and he studied for better than a year in the International Correspondence School. All of Jack's work experiences have been with the state Highway Department. He worked first as a field tester, then in the Elko district lab for about five years. He transferred to the headquarters lab in Carson City in May 1962, as materials and testing technician in the structural materials section. He worked there under Ron Munson. Jack was materials and testing technician II at the time I retired in 1968; since that time he has advanced up the ladder and is now materials and testing engineer II, in charge of welding inspection, a section of the structural materials laboratory section. Jack Stone is married and has two daughters. The family home is on the east side of the Carson River in the Pinyon Hills.

This welding inspection, for what limited amount of structural steel construction we used to have, was done by commercial inspection agencies, such as the Robert W. Hunt Company, rather than having our man travel over into California or back East somewhere to personally inspect the steel, particularly any welding that was done. This job has really become a tough job. For the last four years the United States Bureau of Public Roads chief construction engineer has insisted upon use of structural steel rather than concrete or wood in all major bridges and overpasses and similar structures. This gentleman, a Mr. Carl Hartbiner, has been in

charge of steel construction before joining the Bureau of Public Roads. Now since the Bureau of Public Roads furnishes the major part of highway construction funds in the state, their chiefs can force upon the state a requirement of this kind. I doubt if this man understands that Nevada is principally a desert state with a number of mountain ranges and a state where excellent concrete aggregates are available and cheap, and Portland cement is available both in this state and in nearby Utah and California. And excellent concrete structures, reinforced, of course, by steel, can be built and maintained probably cheaper than can the solid steel structures.

Frequent painting of the steel will be required [to guard against] degradation by wind-blown sand and by frequent extremes of high and low temperatures. There probably will have to be a painting crew put on these structures and kept there permanently. Also, another item to be considered is the cost of inspection. As many as from three to five laboratory employees from the Highway laboratory have to travel to California, principally, and spend a time interval inspecting steel welding of from two weeks to six months, depending upon the volume of the steel structures for a contract or for several contracts. This is a very expensive situation requiring traveling and living expenses away from home station. Some of the men, knowing they will be there three months or more, will require temporary residences and move their families over there. Then, of course, they have to move them back when they come back to Carson City.

Ron K. Munson—I shall tell something about him now. Ron is in charge of the structural materials laboratory, and also the inspection crew on welding of structural steel. He himself at times has been known to stay over there in California with his family

for as long as six months, leaving his chief assistant in charge of the structural materials laboratory. Ron's present rating, 1975, is materials and testing engineer III.

The structural materials laboratory contains the five hundred thousand-pound machine, for testing tensile strength of reinforcing steel and other metals, and compressive strength of concrete cylinders and concrete blocks. Several thousand concrete test cylinders are tested for compression strength in the Highway laboratory at Carson City, the Elko Highway laboratory, and the Las Vegas Highway laboratory, in a year's time. For many years, prior to the time professional engineering labs were available in this state, the Highway Department did testing of concrete and gravels at a reasonable charge for other agencies and political subdivisions, such as the Naval Ammunition Depot, the Fallon Naval Air Base, Alpine County, California and some of the towns and counties in Nevada. However, when accredited professional testing laboratories became available in the Reno and Las Vegas areas, the Highway Department discontinued all outside testing except on special emergencies.

To get back to Ron Munson, he started work with a testing laboratory as engineering aide in July 1962. He advanced in subprofessional grades rapidly and was soon qualified as materials and testing engineer I. His principal work was in the structural materials laboratory, and upon retirement of Hal Kispert in 1966 he was made materials and testing engineer II and placed in charge of that section. With [the] advent of the Bureau of Public Roads insistence to build all major structures with steel instead of Portland cement concrete, Ron was assigned that particular section and he took over the duties relating to all inspection of welding and assembling of steel units before shipment.

Most of this work has been done in the state of California and was referred to in discussing Jack Stone's work.

Ron is a graduate of the White Pine County High School and has had six semesters at Brigham Young University and at the state of Nevada with a major in chemistry, although he did not follow chemistry in his Highway work. He had additional extension courses at the University of Nevada, but because of the expanding volume of his particular work in his particular section, he has been unable to devote as much time as he would like to his extension courses. While a resident University student, he also had training in officer candidate and career schools. Before joining the Highway laboratory staff, his work experience consisted of one year as laboratory helper, and one year as mines control sampler; all that experience, I think was in the Ely area. He is married and has a son in high school.

Joseph Mewes, who left the department, worked there for quite a little time. Joe, although I do not have exact information, he probably is a native of California. His records show that he graduated from Wiley High School and took one year's work in electrical engineering at the Stockton junior college. He had just retired in the U.S. Navy, in which I believe his service there, at least for the last part of it, was in the Seabees. I'm not sure of the length of his service in the Navy, but enough to retire. When he signed with the testing laboratory as engineering aide I, in April 1962, he was turned over to the materials survey section. He understood handling of heavy excavating equipment and was therefore assigned to this materials survey section, and he was made foreman of the crew a short time later. He did a very good job in his materials survey work and his notes were accurate and where necessary quite voluminous. He left the department in

1968. Joe is married, and there is no mention of children in his personnel records.

Bob Arkell was employed by the Highway Department for quite a little time, and although he has not been working there for about thirteen years, his life history certainly deserves some attention. He has had a most interesting life doing work jobs of multitudinous variety. He's had numerous hobbies and he's had a variety of travel experiences. I will not try to enumerate all of his activities. They could best be portrayed by setting him before a tape recorder and letting him talk. He was born in Reno and attended grade school in several places: Reno, Carson City, and Sacramento. At a very early age he was accompanying his father on hunting and trapping expeditions. Those took place in the Sierras, both California and Nevada. Pelts from the fur-bearing animals were sold. Most of this was done in the cold of winter with travel on skis. A very uncomfortable time.

When Bob was eleven years old he was struck by polio and was left for life by a partly crippled right leg. He was not seriously handicapped, however; his future activities will bear that out. When he was fifteen, he became a champion swimmer and established records in the fifty- and one hundredyard freestyle races. He also told me that he holds a record for swimming the length and the breadth of Donner Lake. That must have been a cold experience. He was so good in swimming that he was chosen candidate for the Olympics, but his chances there [were] ruined by commercializing his swimming talents, performing for pay in exhibitions in various notable hotels in the West. He didn't realize that would happen to him but it did; because of commercializing on his swimming, he was ineligible.

He attended high school for a while in Reno, but didn't take too well to school, didn't

finish it. When he was about seventeen he decided he should see the world or part of it. He went to New York and secured a job in the Merchant Marine and during this seafaring interval of his life he made twenty-eight trips from New York to various places in Europe. And, during that interval he joined the Spanish Revolution, in a sense, by working in the field hospital with the Spanish Loyalists. He next journeyed to Durban, South Africa. All this happened before he was twenty-one. Thus, he had been in every country he had wanted to see before he was of voting age.

He came down with two varieties of fever at one time; I'd forgotten just what they were, but he says he could not remember much of about that and he found himself in San Juan, Puerto Rico, next, but could not remember how he got there. However, he was nursed back to health in San Juan, by a nurse, a very amorous one, says he. Upon leaving San Juan he landed in Louisiana, I presume either Baton Rouge or New Orleans, and from there went back to New York and eventually made his way across the country to Nevada. He then attended high school for a short time but never graduated. He has had so many experiences that he does not always get the time elements in sequence, and he said that that happens. So what I say about him may be out of sequence to some extent.

His first experience with the Nevada state Highway Department was with Dan Indermuhl, resident engineer. But Dan was always known as "Silent Dan." He talked more, I think, than most engineers, but he was a very bright fellow. And this particular job was a project near Reno. Bob, at the time, was rodman and grade inspector and chainman on the survey crew. He told me one interesting event when he was on that job; this was [a] contract back in—I believe in the forties. I think it was Number 556, as I remember

him saying it. I remember the contract well because it was on Reno to Lawton's and I had to design the new material for the surfacing there, which I call "treadmix." But the thing that happened there was quite an incident. Traffic was bad in that particular area and Dan Indermuhl had Bob keeping traffic away from the actual construction operations as much as he could, but some of those fellows driving their Model A Fords weren't paying attention to Bob. That made Dan quite angry. One fellow came up in a Model A Ford and Dan took a ten-foot survey rod and rammed [it] through his radiator. When he did that, the man got out and was going to tackle Bob Arkell, but Dan threw him in Dan's pickup and took him to Carson City and had him arrested for violating traffic.

From the period 1938 to 1941, Bob worked on several Highway jobs in the Reno, Tonopah, Ely areas as stake puncher, rodman,, and chainman under resident engineers Denton Hayes, Skunk Brown, Ray Perry, and others. And these experiences gave him a good understanding of surveying, which was vital to him in later years. In 1941, he left the Highway Department to work underground at Kimberly, in White Pine County. He was mining copper ore there. [In] fact he changed jobs and locale so often that he is not sure which event occurred first. He was a taxi driver in Reno for a while, and it was at that time he became acquainted with a young lady from New York state, a visitor in Reno, to whom he was very courteous. Her father, I believe, was an executive in a company which handled foods— cheese, I think—and she happened to come out this way by choice. She had a certain amount of money and decided she would see San Francisco, but she landed in Reno and apparently wanted to see the town. I guess it was Bob's taxi who took her on the tour of the parts of a good many interesting

places in Reno, and later the young lady, Marian Wheeler was her name, became his wife. Of course, Bob although he was just a taxi man, was a good talker, and he really liked this Marian Wheeler. So, it happened that Bob knew [William F.] Harrah, of Harrah's businesses, very well; in fact, Harrah always asked for Bob, when he wanted a taxi. They were such friends, that Bob thought maybe he could go in there and borrow some money from him, which he did. And he tried his luck on the Keno and he ran up quite a little sum. He went to a jeweler and bought a diamond ring, and that was the engagement ring which he gave to Marian Wheeler. I believe she went back to New York and did not come back into Nevada (although she was engaged) as Bob's bride 'til several years later.

In early 1940s Bob took a job with the U.S. Engineers as a surveyor on utilities at McClellan and Mather Air Fields, and later he was a surveyor on location of Honey Lake ammunition dump and on the Stead Air Force base. Thus he gained quite a little more surveying and engineering experience, but he quit the U.S. Engineers in 1945 and did miscellaneous jobs, most of them nonengineering, but rather laboring jobs. He did those until 1956. He came back to the Highway Department in that year working as senior engineering aide on four different construction jobs with part of his time, in 1957, spent as a field tester. In 1958, he was transferred to the newly constructed Las Vegas Highway testing lab where he was put in charge as junior physical testing engineer. This, of course, was just a branch lab, and complete tests of all varieties of things were not done there. But Las Vegas was such a great distance from Carson City that tests, which were important tests controlling the qualities of materials as they were being used, had to be done rapidly. So the concrete

test cylinders and a number of the asphaltic products were the principal things tested down there, although some of the gravels were also checked for quality and gradation. Before the Las Vegas laboratory was built, it might take as much time as a week for the samples to travel to Carson City, and become cataloged, and tested, and results phoned back.

Bob did a good job down in that laboratory. He held it 'til 1961, when he moved to Carson City and was placed for one and a half years in charge of the materials survey crew. For a while in Las Vegas, he pursued some interesting hobbies, one in particular—he was collecting various kinds of bugs, lizards, and snakes. He had a little menagerie there in the corner of his laboratory where he had all those animals. I think scorpions and tarantulas were included, and other animals except quadrupeds. He didn't have any of those. The reason he didn't continue as [head of] materials survey crew was his own fault, of course. He did very well with his crew, but one day, while he was over in the eastern part of the state on the east slope of the Ruby Mountains, he apparently had put his crew to work and told them where to dig and what to do and thought he'd take a little tour and try some of his hobbies, see if he could find some new specimens. At that particular time, the state Highway engineer and Reuben Eldridge, the assistant Highway engineer, were in the area and they found Bob out there. I think an argument ensued over Bob's doings, especially with Reuben Eldridge, and he was dismissed.

He accepted a position as surveyor with the power company in 1964, but before that he spent a couple of years as an engineering inspector of sorts, doing inspecting work on building[s] and other construction in the Reno area. But in '64, he started with the power company here in Carson City as surveyor, and at the present time he's party chief in charge

of surveys. He covers a large area embracing most of Washoe County, Churchill County, Lyon and Douglas Counties, and Carson City. He's worked there for eleven years. I think that's about as long as he's stayed with one job. He and his wife reside in a fine home on the slope of the hillside north of Carson City, between Hot Springs and Lakeview; that particular section has a name, but I can't remember what it is at the time.

Now, Bob is still pursuing various kinds of hobbies. He had the hobby, which lasted for quite some time, that had to do with putting various kinds of small insects and large insects, in fact small snakes, in plastics, and he got to be an expert at doing that thing. He always has had a supply of scorpions, horned toads, earwigs, bats, and so forth. He gave me a Christmas present one time—it was tied up in a fancy box. I opened the box, and here was a plastic containing about fifteen earwigs. which I detest very much, because they raise havoc in my garden [laughs]. He has a sense of humor, no doubt, and plenty of it. He up [and] built a beautiful appearing accessory to his wife's lavatory. It's a seat with about a dozen scorpions in it [laughs]. He has a beautiful set of bookends with bats in each one, in the plastic—bats with outstretched wings. And while it's an odd novelty it has been very, very well done. He has made just a great number of those kinds of things. As a matter of fact, he almost started doing it commercially, but the substance he used and the solvents were getting to his breathing apparatus, and actually was sort of poisoning him. He had to stop it.

Bob, in addition to his bug and snake and tarantula hobbies, has been quite a sportsman. He's been a hunter and fisherman most of his life; however, as he gets older, he resents killing animals. As a matter of fact, he likes nature so well that he has not done any

landscaping, formally or conventionally, of his yard. Instead he lets the sagebrush grow where it will, but he does plant native Nevada cactus and things of that kind, and he has had to fence it to keep dogs out, and he's piled sagebrush in heaps. He did, at one time, secure about fifty plants of a shrub material, from me. And he let them grow for a while. But he says, "You know, those cottontails are so cute. They'll reach up there, chew off a lint and it'll fall to the ground, and then they'll eat the leaves off." I think he has about three of those plants that grew to maturity—the cottontails got the rest. He has pet cottontails and skunks in the yard. At the present time, the skunk population has dwindled down to one, and he tells about the skunks being gentle, and they don't bother him nor his dog; nor does his dog, which is well trained, bother the skunk or the cottontails. He feeds those, and also buys pounds and pounds of birdseed and feeds the birds. Nowadays, he will go hunting, but he won't kill many ducks. He enjoys spending maybe three or four days in the middle of the week, if he has the vacation time, in those marshes at the association's club, just watching the birds and the squirrels. As a matter of fact, there's a squirrel out there that loves bad apples and apple peelings and vegetables and other things. I have supplied Bob with quite a few of those things and he takes them out to "hunter's paradise" whenever he goes out there.

He said to me one time, "Did you ever hear of the language of the swans?"

"Well, I've never even seen a wild swan."

"Why," he said, "those are the most remarkable birds. In their flight over, if you listen many times, they will have at least a dozen different sounds; I think it's a language they use to talk to each other." He likes to go to a particular place between Hazen and Alkali Lake in Churchill County. I guess there are all kinds of game birds in that area.

Bob is a member of the Republican Central Committee, in Carson City, and was chairman for one year of the Mineral and Gem Society. He also served as game warden, for a short time. The gem society was another branch of his hobbyhood. The Arkells have two sons, Bruce, who is Nevada state planning coordinator, and Mike, who works for the Carson City Fire Department. The Arkells have six grandchildren, and Mrs. Arkell is a teacher in Carson schools.

In turning to my own experiences, I found about September 1967, that I would be retired in January 1, 1968. I was already kept two years over the retirement age of sixty-five, so I guess it was time for me to retire, but I was kept on by the powers that be for two years, until the new laboratory was fully built and thoroughly equipped and supplied with people. The matter of choosing a new chief testing engineer came up and while two or three of my employees were going to try for the job, there were several others from other areas. I did not feel I wanted to be on that board on account of the fact that people I had worked with for years were trying; I didn't want [to] outweigh one over the other. I figured, the people who were in charge, and there were enough of them, could listen to their oral reports and make decisions, without my help. So come November first, I took four weeks of a number [of] weeks I had coming to me of vacation, and actually retired January 1, 1968.

I might tell something about the new testing engineer. The board did not choose any of my assistants, but rather chose Jim Desmond, who had been or was at the time, really, chief testing engineer for the Wyoming Highway Department. It may be well at this point to give a resume of Jim's training experiences and to give, in particular, his reasons [for] leaving Wyoming.

Jim is a native of Wyoming, born in Rock Springs. He attended grade school in Kemmerer, Wyoming and graduated from high school in Lander. He attended the University of Wyoming at Laramie and graduated with a Bachelor of Science in civil engineering. He was four years in the Navy in World War II, and was on a destroyer as a torpedo man. He tells about— when asked, if he'd ever torpedoed a ship, "Well," he said, "we were in the vicinity of Japanese ships, but you know those birds kept nets down there so that our torpedoes wouldn't touch them. But we did maul the devil out of one of them, with cannon fire."

His first two years out of college were spent with the state Highway Department as an inspector and field laboratory employee. Next he was employed by the Boeing airplane company, but he said he didn't enjoy that assignment in the least, and after a brief stay he left to go with the Ediger Engineering Consulting Firm, with whom he spent six years. He joined the Wyoming highway lab as soils engineer, and was soon advanced to assistant chief testing engineer, under Mr. Russell, a position, which he held until Mr. Russell's retirement. I knew Mr. Russell very well, having been present with him at a number of testing engineers' meetings in western cities and in Washington, D.C. Jim held the position in Wyoming as chief testing engineer for eleven years, before he came to Carson.

Jim and his wife had three sons. The middle boy had a motorcycle; he was on it and [was] killed in an accident while right near their home. This event really influenced Jim's decision to leave Wyoming and try for the Nevada job when he saw the notice of the vacancy. Mrs. Desmond, in particular, was severely shaken up by the boy's death, and each time she had to pass that particular spot

the reminder was almost unbearable to her. However, Jim remained there in Wyoming, about a year after the boy's death.

The Desmonds came to Carson City in the late fall of 1967, and they really enjoyed the mountains, environment, and scenery. It was quite similar to what they were accustomed to in Wyoming. The Desmonds purchased a home in Carson and were well satisfied with everything, about the job and location, but misfortune arrived in February 1973, when Mrs. Desmond passed away. This was a pretty tough experience for Jim and the boys, two boys. One of those boys is married, and the other boy attended the University, but I'm not sure what has happened to him since; he may have graduated. But Jim found a lady to his liking and he remarried in 1974. Now Jim, himself had a recent serious illness, and in addition to that, his wife had an accident, which injured her quite severely. They like to see these auto races, so they had gone out one evening to Carson race track, and she was struck by a careening, out-of-control racing auto, and she was badly hurt. But she was practically, in November 1975, fairly well recovered.

In taking over the Highway materials laboratory, Jim chose to become acquainted with his new staff and duties by personally spending several days, at least, in each particular lab, seeing what the boys did and how they did it, and studied the organization. And I must say he has done a very good job of it, although I have been away from there for quite a long time. I do go back once in a while especially to leave the girls extra magazines, and maybe chat with a few people once in a while. Of course, during Jim's takeover of the lab it became necessary to expand, which I have already described. The chemical laboratory was extended to make a metallurgical laboratory and the structural

materials laboratory had to be changed and extended to accommodate a testing machine which could supply as much as five hundred thousand pounds instead of two hundred thousand pounds in the old machine. Those Jim had built, and he has the department very well organized, a firstclass operation.

On January 16, 1968, I attended the grandest party I have ever attended in my life, probably because it was put on in my honor. It was at the Captain's Cabin down there at the Mall, the south end of the town of Carson City. Certainly much credit must be given to those three grand office girls, Marie, Barbara, and Dorothy, helped by Shirley Stevens. They made all the arrangements and set up a grand deal. There were a hundred and twenty-one people in attendance including two of our daughters and their husbands. Of course, many of the district engineers and resident engineers, as well as the state Highway engineer, John Bawden, and two of the Highway board members, Harvey Dickerson and Wilson McGowan, and many of the department heads, as well as older associates, who had been retired, and just about all the entire lab crew, and of course Jim Desmond and his wife. I was presented with a tape recorder, a money tree, plus the usual service plague, which in my case represented thirtynine and a half years with the department. I appreciated very much all that was done for me at this gala retirement party. It is something I surely never will forget.

It was now 1968, and I was finished, so I thought, with the good old state Highway Department. However, I was notified about January twentieth, that I was employed for one more year as a professional consulting engineer in connection with one particular phase of Highway duties. I was to continue as a member of the claims board, and was to be paid regular consultant's fees and expenses, as

a private engineer, whenever and wherever the board would meet. As previously explained, the claims board consisted of a chairman, who was the chief legal counselor; the chief construction engineer; the chief accountant, or his representative; the chief testing engineer; and an assistant legal counselor. The new testing engineer, Jim Desmond, of course, was a member. Also we had a secretary and a wonderful pilot. The secretary we had was ordinarily the chief clerk stenographer in the legal section. She took care of all our paper work.

The custom, at the time, was for the board to visit the contract sites or at least the general area in which the contract work had been done, such as Las Vegas, Elko, Ely, Lovelock perhaps, and in Carson City. This was, of course, accomplished by using the state airplane piloted by Lew Gourley. Lew was always remarkably careful; however, it was only about a year or so ago, I believe 1973 or '74, when Lew and his wife were killed in their private plane.

I don't recall the actual number of trips we took in 1968, but it must have been more than a dozen. Several of the trips were to Las Vegas, where a large amount of the construction was in progress especially due to the Interstate freeway construction, and in addition to this work, I performed some private work in 1968. There was plenty of time to do so, as the claims board trips were from several days to two or three weeks or more apart.

I was employed as an engineering consultant by a Carson City businessman to investigate a gravel site in the Dayton area and to make a study of potential markets within a radius of seventy-five miles of the deposit. I completed the study in about three weeks, but my employer, after studying my report, chose to give up the idea. It was really just as well, because it was so far out of his line that I don't

think he possibly could have succeeded at it, and I recommended against it. I discovered at year's end that I had made enough from my claims work and special investigation to credit me with four quarters of social security; of course, the states and counties in Nevada do not give social security. Of course, I paid but little attention to it because "I wouldn't live long enough to get social security," but nevertheless, I got four years credit. It didn't occur to me that I'd ever be able to qualify for a regular social security allowance, but it so happened that things developed and I was employed in 1969, 1970, 1971, and 1972, '73 and '74 in private work, part of the time as an engineering inspector. But that did qualify me for social security, so by December 1968, I had finished all regular special work for the Nevada state Highway Department.

RETIREMENT CAREER I: INCLINE VILLAGE

The date January 1, 1969—I was now through working for others, so I thought, and would try to devise ways to keep up our property, our living expenses, our health, and my four expensive hobbies on two, somewhat limited incomes. Mrs. Little had been retired from teaching for a few years; her rather small retirement income (she taught in public schools for only thirteen years) was, of course, to be counted along with mine. The aforementioned hobbies of mine were gardening, prospecting, trout fishing with a fly, and playing French horn in the Reno Municipal Band and in the Kerak Shrine Band.

With reference to fly fishing, I am sort of a purist. I do not enjoy spinner or bait fishing. To me, fly fishing for trout requires a degree of skill not found in other methods. Of course, conditions have to be favorable; good weather and a clear stream are paramount. Also, the fly fisherman must use judgment in choice in fly commensurate with habits of trout in a particular stream, at a given time of season, and hour of day. My plan for the

summer of 1969 included some trout fishing excursions to my favorite streams, such as the West Walker, Carson, the East Carson in particular, and certain areas in the Truckee. I have had very good luck in past years in the Truckee River, right about at Lawton's. My wife said I always have to show off, so I [choose] that place. Actually there were some darn good fishing holes at Lawton's and I would get out there casting a fly, and she said I was doing it to put on a show for the local inhabitants. Actually, I had lots of luck in there and I caught quite a few fish on a fly. Some of the people who were staying at Lawton's would pick up their bait poles and come out and start casting spinner and bait, and they wouldn't catch a darn fish, and wondered how I was doing it. So I guess I did kind of enjoy the show I put on; it was all part of the fun. However, in speaking of fishing, the population has increased to the point in the Reno and in the Carson City areas so that you can hardly elbow your way to a stream any more. I used to enjoy the upper Carson River. There was one place called the Slide

where we would slide down, theoretically after your wife or someone else had driven you up there, and you would fish down the stream in this wilderness to a place called the Hardpan, where your wife would drive in from the other way in the evening and pick you up. The last time I went down there, there were three to five jeeps right down there who'd come right through the river in low water, and from then on the fishing was no more in that particular area. The last time I tried Lawton's, I think, in June or early July of 1969, and there were so many people fishing there that I just gave up and went home. Now to get back to what to do; I am talking about January in 1969. It was too cold to do much outside except some pruning of trees and shrubbery. I took inventory of the more or less permanent plantings in my yard and counted twenty-six hybrid tea roses and three climbers; forty-eight shrubs of various kinds; eight evergreen trees; twentyseven deciduous trees, including seven fruit trees; and eleven climbing vines, which included two grape vines. There were numerous, numerous perennial flowering plants such as peonies, iris, columbines, delphiniums and others, which I did not count. This yard of mine contains two large lots and part of another, a total of about one-third of an acre in all, and it takes some ambition and plenty of exercise to keep it up. In order to do it though, it has to be fun, and to me it is fun. Gardening, to me, always has been interesting and a pleasurable hobby with exception, of course, of the times in summer, when I was a growing young boy, more interested in other pursuits, but was assigned to the corn and potato patch with a hoe. This particular time was about 1909 to 1912, while we were living on the Chase Ranch, four miles east of Boulder, Colorado. Study of official temperature records, in Carson City, from the period of 1875 to 1965 has enabled me

to use mathematical statistics to compute the probability of deviations of last killing frost data. The average date of the last killing frost, in Carson City, is May twentieth, and the latest date on record of a last killing frost in the spring is June twenty-seventh, I believe. Now, of course, there is much less chance after the average date of [last] killing frost, May the twentieth, if you do your planting of tender things after that date, but you must know by statistical methods—and that can be easily done by taking as many as seventy-eight years, say or something like that, and put down a statistical listing by percentile ranks, as we call it, of these certain number of days between the latest and the average date killing frost. And in those percentile ranks you will have certain numbers. You may use only ten of them and find the first percentile rank above the average date of killing frost may contain maybe the number three or perhaps four or even five. The second percentile might have three and then keep lessening and lessening, the next one two, maybe the next one does not have any, and the next one one, and the next one one, and the last one one, something like that. From those computations you can then pretty well estimate what to do about your gardening. We have only a hundred and twenty days of growing season because the average date of the [first] killing frost, in fall is September twentieth. Therefore, the tender things such as corn and squash and beans, in the vegetable line, must be planted pretty close to the first of June. It takes them from seven days, to say ten days, to come up, and after they're above the ground there's latch less chance of frost than there would be, had we planted then say, in the middle [of] May. Now for tender flowers and tender vegetables [with] quite a long growing season, such as peppers, eggplants and tomatoes, those do require a long growing season, perhaps as

much as a hundred and eighty to almost two hundred days. Now where you have only a hundred and twenty days of growing season in Carson (it's better than that in Reno; they get about a hundred and forty days. Reno has a little better climate than do we)—when you have that condition, then you had better figure out a way to raise these plants, and I have done so, over the years, by using hot beds or cold frames and sometimes both. I do the usual seed planting of the tender plants and the semihardy ones in an electrically heated hot bed, which I have owned for several years. These seedlings, such as peppers, eggplants, tomatoes, marigolds, asters (which are not particularly tender, but which do need an early start), and several other early flowers, petunias and others—these can be planted as early as, say, March tenth, in the hot bed, which is covered at night and which has a temperature-regulated electrical system in it. Of course, you must watch your plantings, in those cases. If it becomes a warm day and you haven't lifted the covers, you could burn the plants up. So it always takes some attention. Gardening takes a lot of work and a little bit of knowledge at least in order to be successful at it. About June first, you can begin to set out the tender plants, but before doing so I harden most of my plants off in a cold frame. You do that, I and] things which are planted, say March tenth, will have quite rapid growth in the hot bed. But they should be hardened off before setting them out in the ground, so I prepare a cold frame, which can be covered at night, and they're transferred from the hot bed to the cold frame and allowed to recover from the initial shock there, and they become hardened off. And those things, then, like your tender marigolds and stocks (which aren't too tender), asters (which really aren't too tender, but they would be damaged by frost), those then can be set out quite safely

in the early days of June. Even then, there's a chance sometimes for frost, but I usually don't get them all out at one time, allowing several of them to freeze or something to happen to them and then fill in later.

I usually transplant marigolds, petunias, asters, stocks, ophioglossum, salvia, snapdragons and a few other of the more tender annual flowers, plus tomatoes, peppers and eggplants, in beds previously prepared and fertilized. The hardy vegetables, such as, onions and carrots, radishes, peas, can be planted about April fifteenth to twenty-fifth. Always, I have had more plants of the tender things than I could use, so it has been my practice for many years to donate these to neighbors and friends. When I had the ambition and time to do so I would plant some of the flowers in the border, along the Highway lab.

Corn, beans, and squash seeds were planted in the open, but no earlier than May twenty-fifth, which would bring the tender new plants up usually around June fifth. Gladiolas were usually planted in separate plantings, the first about April twentieth, and the last planting about June first. This was done to prolong availability of fresh blooms. In all the many seasons in which gardening was probably my favorite avocation, it seemed there was each year an excess of vegetables and bloomed flowers, as well as plants. The daffodils and some of the tulip varieties were sufficiently frost resistant to withstand most April and early May cold spells. These blooms like the other summer and fall flowers always were extra plentiful. I have shared excess flowers and vegetables also with neighbors and friends and have kept bouquets in the Highway offices and some other offices with which I have been associated from time to time during the period April to October. I have never bothered to take pictures of my

flower beds, but my little neighbor, Debbie Walker, has taken so many, that she has an album half full of them. Debbie, by the way, is presently, in 1976, a private first class in the U.S. Army and is stationed in Germany.

In the early part of the year 1969 (I believe it was late February) I was asked by one of the Carson City garden clubs to give a talk on gardening. I occupied the best part of an hour, telling about the climate and geographical environment and something of the geology and soil types of the Carson City area. Then [I] gave some recommendations concerning the three principal nutrients in commercial fertilizers, the necessity of having trace elements, and the value organic matter in gardening. I also suggested they should interest children by letting them have a small area for their own garden and learn the very joy of gardening. We then had about onehalf hour of question and answer time. Actually, my experience with these women's gardening clubs has led me to believe they're for the most part social clubs. What I have had to say to them usually was somewhat over their heads, so to speak.

I did a considerable amount of writing for local papers on vegetable gardening during the war years, and also gave some talks on the subject, passing out mimeographed copies of garden layouts and recommended vegetable and flower parts for our area.

During the month of May, and part of June 1969, I spent some time with Bjarne Pederson, a local contractor who had a concrete ready-mix business on the north side of U.S. 50 just east of the Carson City urban limits. Bjarne wanted me to look around the local countryside with him in search of suitable concrete aggregate deposits. I spent several days with Bjarne in his jeep during this time, but could not find a deposit of any size in any unclaimed

areas within economical haul distance. I had already investigated the really workable areas while I was in the Highway Department. I did not charge Bjarne for this work. I had given him advice and help while he was starting his business, and he had done some favors for me, such as hauling in some good garden soil. A few years after this particular time Bjarne loaned a contractor friend a considerable amount of money on a Reno construction project. The contractor went broke, taking Bjarne along with him. This blow not only put Bjarne out of business, but affected his health. He is now retired and seldom gets away from home.

It so happened that early July 1969 that my idea of being completely retired in order to follow my hobbies came to an end. I believe, it was just after finishing a concert with the Reno Municipal Band around July fifth, that I received a telephone call from Wally White, from Incline. Wally had retired recently from his position as head of state Health and Welfare department, and on May twentieth had taken over as district manager at Incline. Wally said "Prof, why can't some of you retirees from the Highway Department give us a hand up here? We have a lot of construction work going on and not enough qualified people to oversee it." In reply I said I would be willing to help out and would contact other retirees and would let him know. He said "Make it as soon as you can, for we need the help right away."

I contacted the following recent Highway retirees: Ed Boardman, ex-chief bridge engineer; Orrin Walker, ex-chief draftsman; Dewey Harwood, retired U.S. Army officer and ax-Highway inspector; Milton Ross, who had been my field exploration man; Percy Crocker, an ex-inspector of concrete structures; Lee Cochran ex-design engineer; Ace Howard, [ex-]resident engineer and

assistant chief district engineer; and John Stanley, formerly employed in the local office of the Bureau of Public Roads. He had retired in 1965, as district engineer. The only acceptances came from Ace Howard and John Stanley, the last two mentioned above.

As I recall, all three of us made our initial appearance at Incline on or about July seventh, where we were instructed— first introduced, of course, to Erik Beyer, and then instructed by him about our duties. Erik had just been appointed Incline Village district engineer. Beyer, of course, would be our supervisor and would furnish us with specifications and plans for the particular areas to which [we] were assigned. He would also furnish us with printed forms in prepared booklets on which we made out our daily reports in duplicate, one for the district and one for us, so we would have our own reference information on work we had already inspected. We would receive six dollars per hour for regular time which was eight hours, and time and a half for overtime. We must furnish our own transportation, but would be paid only for the time our vehicle was on the job site. This would amount to only five dollars per day regardless of time or overtime spent. We three were retirees from Carson City, and were referred to, when we were better known in the district, as “Highway retreads.” As many as three other inspectors, some who lived in the area, were employed on the 1969-1970 work on Unit 3, Unit 1-A, and Unit 1-B, and the Scotchwood job. All these areas were under contract to H. M. Byars Construction Company of Reno, except Unit 1-B which was contracted to Richard Mandeville, Incorporated of Incline. I was assigned initially to the Scotchwood project; this was a short project on the westerly slope of a mountainside about two miles, as the crow flies, northwesterly from

Incline village shopping center. John Stanley and Ace Howard were assigned to Unit 3 which covered quite a large area just south and east of the Mount Rose highway and north of the area called Edgewood Park, and west of Chateau Acres. Scotchwood joined Unit 3 on its central side.

The Incline Village district office was located on the easterly side of the new Highway Route 28. Highway Route 28 was rebuilt by the Highway Department when it was found the old road was too narrow and there was not enough right-of-way to widen it. This office was also just below the sewage treatment plant and north of the Ponderosa Ranch replica. The staff consisted of the district manager, Wally White; office manager, Kermit McMillan; Anne Verderbruggen, head office clerk typist; and a stenographer, and one or two clerk typists. This office also provided space for the district engineer, Erik Beyer, who spent most of his time at the job sites including construction of water pumping stations and storage tanks, as well as road, sewer line, and water line construction. Maps of the several projects adjacent to the Mount Rose highway specify that no lot or parcel shall have direct access to that highway. This was a requirement issued by the Highway Department as a safety measure. There were, however, many roads within the various subdivisions which served parcels adjacent to them. These roads furnished access to Mount Rose highway with stop signs at the intersections.

In addition to the three “retreads” from Carson City, there were three other inspectors on the Byars contracts: Dave Pond, who lived, as I remember, in Kings Beach; and Merle Sawyer, who also lived in the area; and another man whose name I have forgotten, but who was on loan from the Clair [A.] Hill engineering firm.

THE PRINCIPAL CHARACTERS

I shall next give what might be called something of biographies of a few of the people who were inspectors or who were active in district administrative duties. I think it is interesting from the standpoint of history, and really necessary, to talk about the people who do things; and in doing this work with Mary Ellen Glass, I find that she is much of the same mind. And I have made it a point (which really has made this so-called dissertation quite long, maybe longer that it should be), but anyway I've made it a point to give brief biographies of some of these people. Now as far as this work at Incline is concerned, I was up there interviewing some of the people in just January 1976. And thinking that ladies should come first, I got Anne Verderbruggen to give me just a note or two on her background.

Anne is the head clerk in the district office. She was born in Bemidji, Minnesota, and she had her grade school and high school education there. And her husband left the area and came to the North Lake area to do quite a lot of the tree felling, which had to be done before these roads could be built through the projected subdivisions in the Incline area. She followed him here after he had purchased a house to live in. They have three children, two boys and one girl. They moved down to Genoa, Nevada, in September 19[7]4, and that is not where they live at the present time, however. She started as secretary at Incline in 1969 at 1068 Tahoe Boulevard, the original district office, which has been moved to 893 Southwood (that's more or less in the central area of Incline village) since that time.

Now, I should go to some of these men I worked with at the Lake and some whom I have known for quite a while. I first will give a sort of brief biography of Ace Howard.

"Ace" was his nickname; his initials were A. A. Howard. I worked with Ace in the Highway Department when he was resident engineer and I was assistant chief of the testing division. He was, of course, one of the few Highway retirees who consented to do inspection work in the Incline area, in response to the request of Wally White. Ace started up there about the same time I did; however, his work was all on Unit 3, while I spent the first five or six weeks on the Scotchwood project before being transferred to Unit 3. Ace had purchased a little ranch south of Fallon for his retirement home, but he also had a trailer, which he moved to a site near one of the streets being constructed on Unit 3. He lived in the trailer house during work days and commuted to his home near Fallon on weekends.

Ace was born in Rockland valley in southern Idaho, July 9, 1905 (at that time it was known as Oneida County, but the name was changed a few years later to Power County, because of construction of a huge electric power generating plant in the area). His father owned and operated a sawmill powered by a waterway at the head of Rock Creek. Ace had six brothers and two sisters. I met one of his brothers while I was with the Highway Department. This brother operates a business in the Las Vegas area. I met another brother while I was working in the Incline area; this brother operates the Standard service station at King's Beach. It was not more than half a mile west of the Nevada state line. I had my old Dodge work car serviced there many times in the three seasons I was an inspector in the Incline area.

Ace finished grade school and a portion of high school in Rockland Valley, before the family moved to Brigham County, Utah. He finished high school in Box Elder High School in Brigham City. After high school Ace worked for the Southern Pacific Railroad as clerk at

Ogden and at Carlin, Nevada. He transferred to the motor car department and served his four years mechanic's apprenticeship, two years in Carlin, Nevada and two years in Ogden, Utah, before receiving his papers as journeyman mechanic.

He gave up railroad in February 1934 and worked in Hawthorne, Nevada for the Standard Oil Company until July of that year, at which time he went to work for the Nevada state Highway Department as equipment man. Later, he transferred to the crew of Resident Engineer Messy, where he learned [to] use survey equipment and methods and was soon made junior instrument man. In time, he was advanced to senior instrument man and after several years experience he was made junior resident engineer and finally senior resident engineer. Ace was advanced to assistant district engineer, District Six at Winnemucca, in May 1960. Dale Rose, a former resident engineer was the district engineer there at the time. In 1963 he [Ace] was transferred to Reno to become assistant district engineer in charge of maintenance, and he's serving under Mike Coletti, who is the district engineer. He retired on August 27, 1968.

Among construction projects, while [Ace] was in charge as resident engineer, were two requiring extra difficult work. These were of large size and expensive. The two I refer to were the major construction on the four-lane Clear Creek highway on U.S. 50 and construction in the Interstate system on the Golconda section. There were a number of problems in both these jobs, as well known to my department, and I was involved with them.

As stated before, he became one of the inspectors on Unit 3, Incline Village about the first part of July 1969. I worked on the same project, and often in conjunction with

Ace. Ace describes one [incident] which occurred near his trailer. This is a rather interesting situation. At night, he heard a sound which was familiar to him back up in the woods, which appeared to be beyond the construction project. He was curious, so he left his trailer and walked up there, and he found the Indian loader [there] backfilling a trench which had had the sewer line and water line in and compacting it by wheel rolling, after dark. Ace put a stop to that right away and had him do the job over again next day. He thinks Joe Krmpotic, the foreman had put the Indian up to that; no doubt that was the case.

As it occurred, a bad thing there on this project; some places on this unit were infested with some aggressive yellow jackets. They're a different kind of yellow jacket than I have ever seen. One of them got Ace on the arm, and that arm was swollen so badly he had to go see a doctor about it. Before it was completely well he had another sting and I think that was on his thigh. And he had terrific swelling, so the doctor advised him to get away from that area. He said, "If one of those bees or yellow jackets should strike you up around the throat, you wouldn't last more than fifteen minutes." So, Ace had to leave the job; I believe it was sometime into September.

Now another one of the three has-beens was John W. Stanley with the Bureau of Public Roads. "Retreads" is the name we were called. I had known John for several years and had been in his office when he was with the Bureau of Public Roads, and many times we had meetings there relating new state Highway projects, also to U.S. Bureau of Public Roads projects, in some of the mountainous areas of the state, which were directly under the supervision of the Bureau of Public Roads main office in Carson City. Nevertheless, we in the testing department were usually consulted

regarding the soils quality and the testing which was necessary, which saved the bureau of sending a sample clear to San Francisco.

John had retired from the Bureau of Public Roads in 1965 and when I asked if he could help Wally White as an inspector at Incline, he accepted readily. Thus, the three of us became inspectors on the 1969 roads and pipeline construction on the Boise-Cascade Unit 3 and on Scotchwood. However, we did not start until the year was about half over in July.

John was born in Mankato, Kansas, the only boy in among four other children. His father died when John was only seven years old, thus he became man of the family, and his mother depended upon him for a considerable amount of the duties about the home. Also he worked at some outside jobs, thus making contributions to the family income. The Stanleys moved to the Boulder, Colorado area just as John had finished his junior year at high school in his Kansas hometown. John finished his senior year in high school and worked his way through the University of Colorado, which is located at Boulder. He graduated in 1933 with a Bachelor of Science degree in civil engineering. During summer vacations he had worked as a student engineer for the Bureau of Public Roads and for the Colorado Highway Department, such work being in the field of surveying. Upon graduation he was hired by the state for a time, and also by the Bureau of Public Roads, as a highway engineer on surveys and finally was a project engineer. The Bureau of Public Roads uses the name *project* engineer, while we in the state Highway Department called them *resident* engineers.

I was interested to know that John had spent so much time in and around Boulder, as I had lived just four miles south of Boulder on the Chase ranch, which my father had

leased, for a period of four years. Although John was there twenty-five years later, we discussed many features of the place. I was familiar with much of the area, such as the Flatiron Mountains, the frontal range of the Rockies, the Chautauqua, where I had seen many shows and one lecture or sermon by the famous Billy Sunday. Of course, I was only seven to eleven years old at the time. Two events that stand out in my memory, events at Boulder, were first, the appearance of Halley's comet, in the western sky, in 1910; and the [Jeffries]-Johnson prize fight, July fourth. That prize fight was not held at Boulder, but both my dad and I were very interested. I believe that was also about 1910. We had been up Boulder Canyon on a Fourth of July picnic, and when we got to Boulder, Dad took me to the telegraph office to find the verdict. We were returning, in those days, by buggy; cars were not much in vogue at that time. Jeffries, my hero, had been defeated and made me a very disappointed boy; Dad was not pleased either.

Returning to John Stanley, he met the girl he was to marry in Boulder, and the wedding took place in 1937. During the period 1940 to 1944, John was with the Bureau of Reclamation, in Denver, except for a very short time with Boeing Aircraft in Seattle.

The Stanleys moved in 1944 to Boulder City, Nevada, where John was again employed by the Bureau of Reclamation. John went to Iraq in 1956 with a private engineering firm. He was on that assignment until 1958, at which time he joined the Bureau of Public Roads and came to Carson City as district engineer, a position he held until his retirement in December, 1965. He was in retirement only three and a half years when he took the inspection job as a private engineer on Unit 3 and on Unit 1-A at Incline. He served there, of course, with Ace Howard,

and me, and with Merle Sawyer, Dave Pond, and with a man whose name I cannot recall, but he really was at the Lake supposedly (this particular man I'm talking about) with his boat. His boat was always fastened to the roof of his car; nevertheless, he did help out for a while with the inspection. John continued with the inspection on these projects when the jobs reopened in the spring of 1970. He says that since finishing at Incline in 1970, he has placed emphasis on one thing only, that is retirement.

John is a member of the Elks Lodge; he also is a fellow in the American Society of Civil Engineers and is a member of the National Society of Professional Engineers. John and Mrs. Stanley are the parents of two sons; the oldest has a Master of Science degree in mechanical engineering, and works in research on his chosen field at Boise, Idaho. The younger son has his Master of Science degree in education. He obtained that from Flagstaff, Arizona and, at present, is teaching in Sparks, Nevada.

I interviewed Kermit McMillan on one of my recent trips to the Lake. Kermit, who had been office manager at the Incline General Improvement District headquarters for a number of years, was appointed as district general manager upon retirement of Wally White, January 1, 1976. Wally had been hired to handle the jobs soon after he had retired as director of health and welfare for the state of Nevada. Wally organized all functions necessary to such an office immediately upon taking over [on] May 20, 1968, and he remained as Incline district general manager until December 3, 1975, when he retired for a second time from a top public office. The district was fortunate in securing Wally, whose background of experience and dedication to public service, together with his natural bent for organizing groups and getting

them to work effectively, was well known. I am sure he will be long remembered for the service he rendered, by the people of Incline, on these past eight years of phenomenal growth of the district. Kermit McMillan, who had been office manager since 1965, and who was thoroughly familiar with the duties required of the district manager, was a logical choice for the job.

Kermit was born in Coldwater, Kansas, a town in the south central part of the state. His father had an auto service station and tire sales. He is the youngest of three children, a brother eight years older and a sister four years older than he. His grade and high school years were spent in Coldwater. He received his Bachelor of Science in business administration at the state college in Emporia, Kansas. He married Carolyn Davis in December, 1960. When asked how he happened to come to the Lake Tahoe area, he stated that it was through his father-in-law, Leo Davis, who had been employed by a Kansas construction firm. This firm, Spurtzur and Dutton of Hays, Kansas, had built the first sewer plant in the Incline area in 1961. While visiting in Kansas, he suggested to Kermit that he come out to the Tahoe area. Accordingly, Kermit and family moved out in July 1965 and shortly after arriving, he took over as office manager for the Incline General Improvement District. This position was obtained by Kermit on an earlier visit to the area. He held the office manager job from July 1965 to January 1, 1976, which time, of course, he took over as district general manager.

The McMillans have four children, one girl and three boys. They live in the Mill Creek subdivision at the Incline area, at 1092 Flume Road, their residence ever since coming to Nevada. The McMillans are members of the local Presbyterian church and Kermit is a member [of] the Session. He is a member of

the Optimist Club and has gone through the chairs in that organization. He also holds a life membership in Sigma Phi Epsilon Fraternity.

Kermit described briefly his new duties. Basically, it is the duty of the district general manager to carry out the policy of the board of directors, consisting of five elected members. However, the general manager acts in an advisory capacity with respect to policy making and decisions. There are essentially three main departments: one, a general administration and research; two, utility operations involving two basic maintenance crews, one on pipelines, water and sewage and the other on mechanical problems; three, the recreation department. The [recreation] department is in charge of maintenance of the two beaches, Incline Beach and Burnt Cedar Beach, and the Little League ball park. This park is in the process of being enlarged and landscaped. Slope treatment, grading, and drainage have been finished. Turfing, the lighting, and enlargement of the grandstand, and construction of storage and toilet facilities are still in process. A model is displayed on a table in the district office. The uninformed may be led to believe that some of the other quite extensive recreation areas, such as the golf courses and tennis courts, are under control of the district, but this is not the case, except indirectly, as ownership and management is private.

I believe on this date [January 26, 1976] I'll first tell something of the personal characteristics, and actually the biographies in a small way, of two very important men on these projects. One is Erik Beyer, the district engineer, and the other is Leo Tuccori, the superintendent of Byars Construction Company. These are what I call self-made men. They were probably in their middle or late thirties or early forties and they were workers. And they were dedicated men with

just a world of responsibilities, and I think they deserve being talked about.

Erik Beyer was born in Denmark and had three sisters, all of whom also were born there. Then he was fourteen, the family came to the United States because his father didn't like the possibility of a Communist type of takeover which appeared to be on its way at that time. Before they could immigrate to this country, they were required to have a sponsor. A sister of Erik's mother was here already; she and her husband resided in Carlin, Nevada and acted as sponsors. The family had some problem with finances at first (due to limitation of currency exchange, which was fifty dollars per individual, thus for the family of six, amounted to three hundred dollars). The family, after moving to this country lived with Erik's aunt and uncle for a few months until his father could become employed by the Southern Pacific Railroad in Carlin.

In his schooling, Erik had finished in Denmark the equivalent of a United States seventh grade or thereabouts. He completed the eighth grade at Carlin in one-half year and started high school at the beginning of the second semester. He graduated in three and a half years. Because of excellence of his work in high school, he received a Harold's scholarship to the University of Nevada. He entered the University as a premedical student, but switched to electrical engineering the following year and spent only one and a half years in that major, at which time he quit school and became employed in the state Highway Department in District Three, which had headquarters at Elko. He worked in the field on surveys under John Souza, the resident engineer, and Leland Ford, who was party chief. He was drafted in 1957 and spent two years with the Army in guided missile service in Germany. Out of the service in fall of 1959, he went to work in the signal

maintenance for the Southern Pacific Railroad at Promontory Point, Utah, but returned to the university of Nevada in the second semester in 1960. His state Highway experience had created an interest in civil engineering. He thus enrolled, this time in civil engineering, and graduated with a Bachelor of Science degree in civil engineering in 1962.

When a senior, he held office in the student chapter of the American Society of Civil Engineers. His first job as a civil engineer was with the California Highway Department, beginning in September 1962. On that job he was a junior civil engineer in the department of transportation in San Francisco. He was moved to Santa Rosa in 1963 where he worked on construction surveys and inspection. Again he moved to Sacramento in June 1964 as an assistant civil engineer in the state department of water resources where he studied pumping plant locations and designed some of the alignments of aqueduct developments [from] the Oroville dam to southern metropolitan areas. He continued in the water resources branch of the department of conservation, but as assistant engineer until January 1969. While thus employed, he was chosen by the local chapter of the American Society of Civil Engineers as the outstanding engineer. He is licensed in both California and Nevada as a professional civil engineer.

In January 1969, he was appointed as district engineer for the Incline General Improvement District where he was responsible during the period 1969 to October 1973, for construction of ten subdivisions, including a 150,000 feet of water mains, 210,000 feet of sewer lines, and almost twenty-three miles of streets. His duties included review of plans, supervision and inspection of personnel, preparation of change orders (as jobs progressed), and he also prepared progress estimates and other functions

relating to supervision of construction. Total cost of these various projects was in the neighborhood of \$15,000,000. In October of 1973, he was chosen to act as district engineer for construction of the \$4,300,000 sewer project from Round Hill to Glenbrook in the Tahoe-Douglas area, which was finished in June 1975. I was privileged to serve with him as engineer-inspector on this project in 1973 and 1974, and on several of the Incline construction firms from July 1969 'til late November 1971. Erik is at present, head of Erik Beyer and Associates, Consulting Engineers located at 754 Mays Boulevard at Incline Village, Nevada, where he and his associates are available for engineering-consultant services.

Erik was married in 1961 to Karen Abbott, a native of Reno and a graduate of the University of Nevada in elementary education. They are the parents of five children, three boys and two girls. Both Erik and Mrs. Beyer are active in the Mormon church. Erik is the Mormon church's institutional representative which includes responsibility for all church-sponsored units of the Boy Scouts north of the Truckee River, which includes Reno and Sparks, and extends easterly as far as Gurneyville and Quincy, California. He is also district vice-president of the Peavine district of the Boy Scouts of America. This work with the Scouts involves visitations to all Scout units within the district.

The other of these self-made men, so to speak, is Leo Tuccori, superintendent of the Byars Construction Company. Leo is a native Nevadan; he was born in Verdi. His father, of Italian lineage, was born in Italy. His mother was of British Isles lineage; she was Welsh-Irish. Leo's formal education consisted of grade school at Verdi and high school in Reno. He did not attend college.

He spent four years with the Seabees in the Korean War, after which he began a career in construction of highways and of underground utility lines. He started at the bottom of the scale as a laborer, first with Andy Drumm, the notorious Fallon contractor who had the contract on the Verdi bypass with the state Highway Department. He next went with the Isbell Construction Company on the Kietzke Lane project in Reno, and was with that company for sixteen years on numerous state Highway contracts. The fact that he was a hard worker, eager, and quick to learn was soon noted and appreciated by the Isbells. He thus advanced up the scale in the construction crews from laborer to equipment operator and to foreman. He joined the H. M. Byars Construction Company in October 1965. His qualifications and ability were well known to Byars who had worked with Leo when they were both with the Isbell Construction Company. He was thus made superintendent on the Byars contract in the Reno-Sparks area, which involved laying of sewer lines and constructing forty-eight-inch concrete pipeline under the Southern Pacific Railroad.

In the period 1965 through 1968, he was superintendent for Byars on several [sewer] projects in eastern California, and Meeks Bay in the Tahoe area, and on Kingsbury grade in Douglas County, Nevada. These projects were sometimes in subdivisions and involved construction of sewer and water facilities and some paving. In 1969 through 1970 he had full charge of the Byars Construction projects at Incline, including Scotchwood and Unit 3; also, on the mountainside east of Incline where dwellings were all in replica of Swiss chalets. This area is called the "Tyrolian village." In addition, Byars had the contract for constructing the twenty-one-mile long pipeline that carried treated effluent from the Incline treatment plant and pumped it

over the Clear Creek summit through Jacks Valley to the Carson River. This was done in the 1970-71 period.

Leo had charge of numerous Byars contracts from 1971 to 1975. These were principally water and sewer lines, but involved considerable repaving over highways already paved when the sewer mains and water lines were laid in the travel lanes, it being customary, in mountain regions to use the highway itself or roadway itself to construct these lines on account of accessibility in the wintertime. When the snow is as deep as four or five feet, it is difficult to find these lines to repair them in the snow. However, the roads are kept clear and repair is made much easier in smooth places. Exception to this is made, of course, where there are cross-country lines, which are necessary also. At the present time, 1975-1976 there are under way, or already finished, eight million dollars worth of Byars projects in Placerville, Oroville, Tracy, and Clear Lake, California. These also are under general supervision of Leo. He is a very busy man.

In 1974, he spent a short time in France as guest of the manufacturer of the Poclain backhoe. Byars had purchased several of the Poclain hoes because of their adaptability to trench excavation and excellent service without frequent breakdowns. I have been engineering inspector during parts of 1969, 1970, 1973 and '74 on some of the Byars contracts and have had the opportunity to closely observe Leo's good personal traits and his ability as a manager in a very demanding responsibility. We have had good professional and personal relations during these years. Leo's home is at 10770 Osage Road in the Reno area. The Tuccoris have three children, two girls and one boy. He is a member of the Reno Elks Lodge, and he has a commercial pilot's license, which includes instrument apparatus for flying in obscured visibility.

In reviewing the construction operations at Incline, which I observed and inspected during three construction seasons, I can refer to somewhat copious notes in my daily reports. These notes deal mainly with technicalities relating to construction of utility lines, such as gas, water, and sewer, and to highway building. These technicalities of construction, while important and essential to modern living, they form but a fraction of the total picture. The historian's chief topic is people, and he will consider mainly the other components, the social, the economic, the legal, and the ecological as they affect the lives of people. (Fortunately, the last named component has been given great consideration during the last several years in much of the Tahoe area construction.) Thus, the people themselves make history, what they do, how they do it, their personal traits, their effects on contemporaries, the probability of their legacies in terms of accomplishments affecting future generations. All these are sought by the historian. It is apropos that he so do. The chief interest not only to him but to his readers, is people behavior. Some of the most interesting people we meet in our varied walks of life are the "little fellows" and those of middle stature in society—the ones about whom the writers seldom write and the songsters seldom sing. While some of them do get credit and somewhat limited recognition, it is this great mass of people who carry the load of history with a great preponderance of story and song going to the relatively few who are the leaders and do the directing.

In an attempt to tell of interesting people in my journey through life, I have omitted many of the names of those in top places who have already received much credence and publicity; rather I have emphasized many biographies of those who have been close to me in some of my work pursuits.

My memory cannot be relied upon even to repeat the names of many interesting people. I have had an advantage in describing people with whom I worked in materials and testing section of the state Highway Department. I had access to employee records and I was able to interview many of them to learn more about their personal lives. A different situation is encountered with respect to information relating to the many people with whom I spent at least ninety-five percent of my working hours as an engineer inspector during the construction seasons of 1969 through 1974. These are the contractor's crewmen, including the superintendents, the foremen, the equipment operators, the pipe layers, and the laborers, also the powder men, equipment repairmen, and the grease monkeys.

At the present time, early 1976, most of these people are scattered so badly they cannot be readily contacted. There are a few, however, who are still with the Byars Construction Company headquartered in Reno. From some of these people I'll try to find out more about their personal lives and experiences, which I know will be interesting. Because of similarity of construction of these Boise-Cascade projects it is probably best to discuss them in a collective manner or in a general way without referring too much to technical matters relating to inspection. However, I will dwell some on the latter later on.

National and racial origins of these crews were quite diversified. Most, I believe, were nevertheless, U.S. citizens, but some I am sure were not. They include Paiute and Washoe Indians, Mexicans, Greeks, Italians, Yugoslavians, Germans, Frenchmen, Basques, Africans, Scandinavians, and some from the British Isles. I don't believe there were any representatives on these projects of the Orient or Arabian areas.

Crews of Teichert and Shea, the contractors on Units 1 and 2 and on Unit 4, also contained a variety of ethnic origins, but not to the extent of the Byars crews. The Teichert and Shea crewmen were partly from California, especially the superintendents and foremen. Equipment operators and laborers were from both states. Teichert maintained a branch headquarters in Truckee, California, and many of their crewmen lived there and commuted to the Incline job sites over the Martis Creek-Kings Beach shortcut. The Shea superintendent and foreman, and many of their crewmen, resided in trailers in the Kings Beach and Incline areas. The Shea principal headquarters was in Redding, California. The Byars headquarters was in Reno, and many of the Byars crewmen commuted from the Reno-Sparks area, others resided in the Tahoe-Truckee areas. Mandeville was the contractor on the small subdivision, Unit 1-B, which was located in the high country immediately west of Unit 1. He had but a small crew, but I did not work on that project prior to paving operations, and was not familiar with his operations and crewmen. The paving I did inspect, but the paving was done by a subcontractor. In my observation of these several crews, I could perceive no correlation whatever between ethnic origin and degree of knowledge and ability, nor between ethnic and degree of application to their work assignments.

Joe Krmpotic, one of the principal foremen, was a hundred percent Yugoslavian descent. Pete Thomson, another foreman, was of Anglo-Saxon forebears. Raymond David, one of the very best equipment operators, was a full-blood Paiute Indian. One of the top hands at pipe laying and manhole construction was of Grecian descent; I don't remember his name. Another top hand at concrete finishing was an Indian, whose exact ancestry and a name I do not remember.

In turning briefly to the history of these projects in which I was one of the inspectors, they were all Boise-Cascade developments, except a relatively small Scotchwood project, which was handled by a small private developer, whose name I do not recall. Of course, there were numerous other developments already completed as far as utilities and roads were concerned. Power and telephone lines, however, on the old projects were all above ground. A sewer treatment plant was thus already in operation and the sewer mains already laid for these projects; that is, these older ones, were used to collect the inflow from the newer Boise-Cascade areas. The treatment plant, of course, had to be enlarged, however, to accommodate the increased volume.

This treatment plant is located at the end of a short road called Sweetwater Road, and it is located about a half mile from the intersection with Tahoe Boulevard and northeasterly from the Ponderosa Road. Treatment does not include the tertiary phase, which would remove nitrates and phosphates, but the effluent from the plant is clear and while not suitable for domestic water, it can be used in watering livestock. It flows by gravity to the south end of Sand Harbor, where a pumping plant was constructed to force it over the Spooner Summit and down to Jacks Valley, while five separate outlets in the line allow it to flow over ranchland where it is utilized to water livestock and fertilize ranchland. The line extends to the Carson River and is approximately twenty-one miles in length. This line was, of course, built by Byars in a separate contract, 1970-1971. And Merl Sawyer, who resides in the Incline area (I'm not sure just where), was the inspector. Thus, all the outgoing effluent after treatment, is carried away from Lake Tahoe. Even if the effluent were thoroughly treated, to put it

into the Lake would be a mistake, because it would develop the growth of algae and would clog the Lake [and] interfere with its beauty, perhaps its fishing, sailing, and so forth.

Water supply for the Incline area comes from the Lake, and because of its relative purity, requires little chemical treatment to meet health standards. The newer systems together with facilities already established are divided into pressure zones, each representing two hundred feet in elevation. There are as many as eight zones, sixteen hundred feet difference in elevation altogether. Each of these zones is served by water tanks of sufficient capacity to supply all services required in the particular elevation zone. Some of these tanks together with service mains and pumping stations were still under construction during the time I worked on Incline. Construction of water tanks and pumping stations was not included in work I have described; however, the mains for each of these contractor's units were placed by them.

CONSTRUCTION METHODS

In talking about the Incline district, the people, and contract work, I realize that for a historian perhaps a hundred or two hundred years from now, things would be so different at that time, he would want to know how these contractors, a hundred or two hundred years ago, were organized, how they worked, and what kind of equipment they used. Therefore, I shall include statements regarding these things, whether they're interesting or not to present-day readers.

It is always necessary for a contractor on highway and pipeline construction to install a job headquarters, preferably centrally located. Usually the area chosen is easily accessible and must be large enough to stockpile construction supplies and serve as a parking

area after working hours for construction equipment. Sometimes temporary storage facilities are also provided for diesel fuel, gasoline, and lubricants, and there is always a suitable structure to serve as an office. In modern times this office is usually a trailer house with two or more compartments. An office man, and on larger jobs, a clerk typist is hired. This office is always provided with telephones and radios; pickups and vehicles used by superintendents and foremen, repair and fueling trucks also are provided with radio intercom. Immediate communication saves time and money. A watchman is present on weekends and after working hours. The local headquarters serves also as a gathering place for conferences with supply people and others. Safety review sessions are required in each area, and are held with all hands in attendance, usually, a half hour before work in the morning.

There are some smaller projects handled by a local contractor where his residence may be used as an office. The three principal contracting firms on these Boise-Cascade projects all were provided with the same kind of facilities, also, they used similar construction equipment, and their employees, largely unionized, were of identical working classifications, although [laughs] not necessarily identical as far as ethnic origin is concerned.

Occasionally, it became necessary to hire outside help for special operations. Asphalt paving firms were subcontracted to do the paving. owner-operators of heavy drilling equipment were sometimes hired outright, to handle drilling and large, tough rock formations. In one case, the owneroperator of a mechanical sloping and cleanup device was hired to do the shaping and cleanup of fill slopes because it was much faster and much more efficient than doing the job with

ordinary equipment and hand labor. This was a newly marketed device, not yet obtained by the prime contractors. A truck was used with this vehicle to pull it along the roadway. At times a contractor may be short of hauling vehicles because his own are tied up on another construction project in a faraway area. In such cases he hires additional trucks from a trucking contractor along with their operators. This occurs where long hauls of base and asphalt surfacing and special backfill materials are needed in large volumes.

Another branch of the engineering fraternity is hired, that is the testing fraternity. Contractors seldom have their own facilities to do that; there usually are commercial laboratories which are equipped to do the work. And they will have men visit these various jobs at designated times to take samples and determine compactibility of the various materials, and will recheck by taking samples out of the finished materials to see if they are up to standard.

A sort of outline of the way construction items are handled and the use of equipment is necessary. First, to mention the principal operations of construction in perhaps chronological order, there comes in the timbered, mountainous country, of course, the very first operation; which is clearing. The clearing on these roads was done under an earlier contract, most of it by the Byars company, I believe. After the timbering, the next operation is one of grading. Where no pipelines are to be laid in the road, a quite thorough job of grading is done at one time; but where pipelines are to be laid in the road, the grading is done first in rough fashion, but almost to regular grade lines and slopes. Also, at the same time, provision must be made for drainage, which means trenches must be dug, big enough to handle the size of pipe estimated to carry the water which it will receive or big

enough to put in a reinforced concrete box. After the rough grading and most of the drainage structures are in, the next thing to do, where utilities are put underground, is to dig the trenches for the utilities and lay the lines. This, of course, includes (in these mountainous areas) sewer lines and water lines and gas lines, always. And in these more recent jobs, the ones which I am describing, power and telephone lines were also put underground and in the travelway or roadway area. After this has been done—and in so doing, sometimes very difficult problems are encountered. You have to go through marshy areas in some of these mountain roads, and that makes it a real problem, because for every cubic foot of earth you take out, another cubic foot of earth slides right in that very place. So to do as much excavation of that muck as they can, and right immediately behind it, they put in crushed rock, to make a stable base. That is one of the bad problems the estimator must look over carefully when he [is] making out the contractor's bid estimate. These are expensive places to handle. Other expensive places are solid rock areas, which must be drilled and shot. And when they are shot, the shooting is usually arranged so that as much as six inches or more of extra rock is taken out below profile subgrade.

After the utility lines have been placed and compacted, then it is time to do the fine grading of the subgrade, after which the next stage, in most construction, is placement of base course. Sometimes, where the terrain contains excellent material, very little base course is needed.

On these three main jobs there were three types of base. One was just plain decomposed granite with some crushed gravel added; that was done on Units 1 and 2. On Unit 3 cement-treated base was used. I can explain that more in detail later, but you might say

it can be hauled into the road premixed, or cement can be added on the road and road-mixed after water has been added. It sets up and makes a rather hard base. But when that is used, traffic must be kept off from it until it is time to put the surfacing on, which is usually in about five to seven days. Another type of base was used on Units 4 and 5. It was composed of a red volcanic scoriaceous lava, and it worked out very well. This lava or scoria did not require much processing. It was simply scraped off the deposit and loaded into trucks and hauled. The deposit was located a few miles below Truckee, above the southerly bank of the Truckee River.

The final thing, of course, is paving, and the cheaper pavement for these secondary roads is of asphaltic type. That is the last of the principal projects described in order. The way these quantities are measured when they are mentioned in the contract as pay items in a certain way, those will be described later.

It might be said that there is a tremendous capital investment in the type of equipment which is used in these various operations. First on the preliminary work to build subgrade, in mountain areas, there [are] always rock cuts, which have to be drilled with a shot. There are very expensive drill rigs which can do the work thoroughly and in a short time. In small rock areas, small drill rigs, which [are] compose[d] of just an ordinary compressor with lines and regular drills, are used. Grading is done by blades, but sometimes other equipment is used for short hauls, equipment such as the ordinary loaders. For long hauls, where it is necessary to haul fine materials into cover rock bodies, trucks are used.

In trenching there are a number of varieties of equipment. The big equipment, like the Poclain backhoes, have a bucket of at least three-quarter-yard capacity. They're

very heavy backhoes and they are needed. Sometimes they can go through fractured rock areas without necessity of blasting, but it takes a heavy, stout piece of equipment to do this kind of work. Another thing which can be mentioned now is the necessity of having a water truck or several water trucks on the job. The subgrade materials, the soil materials especially, and as well as the base materials later on must be compacted. It has been found in the last several decades [that] compaction is improved by adding water; in fact for any given material there is an optimum amount of water to use in order to get the maximum compaction. Specifications usually specify a certain percentage of the optimum compaction, and tests are made on the various materials to determine what the optimum moisture content is to get maximum compaction on each kind of material. On the lower traffic roads, ninety percent of optimum compaction (that is, weight per cubic foot) is required on the high-class highways which carry heavy loads and a lot [of] traffic, ninety-five percent usually is specified for subgrade and base materials.

The bulldozer is a mighty handy piece of equipment, because it is on tracks rather than on tires and in doing cleanup work or clearing brush and trees and stumps before a job is graded, they're very useful. Also some backhoes are on tracks at times, and there are occasions where they're much more useful in pipeline work than the rubber-tired things because they can hang onto a hillside or a grade without sliding back. In addition to a bulldozer, occasionally a dragline is used for pulling timber or pulling other items quite a little distance; however, there was not much use in the Incline area, as I recall for that instrument. The bulldozers were used extensively, however. The bulldozer comes in mighty handy where steep cuts are

encountered, and after being blasted they're very rough and the 'dozer can get up there and push the stuff down. And there's only a short haul as a rule from cut to fill, and he can get that work started in the steep cut sections better than can any other kind of piece of equipment.

Now in construction of the base course, if base must be hauled from any distance, a large fleet of trucks is required. If most of the base is nearby and can be used without getting in trouble with the "ecologist," the machines such as mechanical loaders are used. Loaders are necessary in any case to get the material onto the trucks, and contractors have a number of these. There are several makes.

Now when it comes to finishing these base courses, the blades must again be used, because they must be finished to conform to survey stake levels, and it must be carefully done before the surfacing is placed. There must also be some rolling, both in the subgrade and base. On the subgrade, I forgot to mention that the rollers usually are of the *sheep's foot* type, which are not self-propelled, but are pulled by another instrument. The flat-wheel roller is seldom used on base courses. In trenches we must also get maximum compaction, and the compactors there are usually the whacker type, which is sort of a "jumping jack" deal which propels itself as it compacts. There are usually two sizes of these, and they're handy to use in narrow trenches, where the trenches are wide enough. Another type, a *vibratory* roller type, is used. Now for compacting base courses, a large smooth-type, two-wheel roller is used on these smaller or secondary projects. Where compaction must be ninety-five percent, a vibratory roller of large size is usually used. These are smooth-wheel rollers.

Now turning to paving, in modern times on all of these roads they seldom use the

liquid type of asphalt, which can be road-mixed or plant-mixed. That is done, however in maintenance work to repair, but not so much on construction. It so happened on all three of these jobs, which I have described, the paving was done with what we call hot mix, but two of the contractors did not have their own payers (or at least did not have them available), so they hired other people such as Nevada Paving to furnish the hot mix. Whether or not the paving is done by the contractor, all payers have to have a stationary *hot plant* which mixes the hot asphalt with rock which is heated in a dryer. The entire outfit including a dryer, a mixer, the storage tanks for asphalt, compose what is called the hot plant. One of the contractors, Teichert in fact, used his hot plant, which was set up at Truckee, to furnish the hot mix.

Pavement is laid by another special mechanical tool called a *paver*. The raw paving material is dumped in front of this paver; it is then picked up by the paver and remixed by a mixing apparatus and is spread by a flat reciprocating instrument called a *screed*, which levels off the surface. These payers can be adjusted usually to a width as small as say eight feet to a maximum of twelve, usually. And on these secondary roads, which may have only twenty-four to thirty-five foot of width, of course, the paver has to make two or more trips up and down the road. Shortly after the paver has finished, the breakdown roll, as it's called, is done, and this is done by a smooth two-wheel roller. The rollers, of course, must be constantly kept moist by a water tank, which slowly pushes water out, which is spread by an absorbent fibrous material over the roller. After this initial breakdown, some time is required before the final rolling can be done. It is done by the same type of roller. This describes, in main, the principal projects and equipment that [are] used. However, in some

cases there is placed, what is called a *seal coat* of liquid asphalt over the top of the finished pavement, and this seal is then covered lightly with a spread of, what is called *chips*. This does not always take place. I do not believe it took place on these roads on the projects I am describing. There may have been a flush seal put on after the first year of use.

At the present time, in 1976, we can expect a really significant rise in the cost of construction requiring use of heavy equipment which, of course, depends upon the petroleum products for operation and maintenance—that is, the diesel fuel and gas for operation and lubricating oils for maintenance. The obvious reason for which (everybody is familiar with it) had to do with the necessity to import these products from foreign cartels.

On Unit 3 there were two projects under construction at the same time, the golf course, and the road and utility pipeline job. Byars was the contractor on Unit 3 in the latter category and did all the work. As far as the golf course was concerned, however, he did do some of the grading and drainage work. The rest of the golf course, the sodding and preparing the putting greens, things of that kind, those were all done by different people working for the BoiseCascade company. The Byars contract on Unit 3 involved construction of roads and utility lines in the residential sections, and all of these sections were mainly in peripheral areas of the district, the golf course occupying more central parts of Unit 3, but actually occupied fully one-half of the total area. The fact that Byars did a little differently because the golf course made his work slightly different from the other principal contractors.

It must be said here that on these contracts there was no interference in putting in drainage structures and utility never been any such things in these areas, which was a good thing for the contractors.

In referring again to ecological considerations, which I mentioned, all utilities were placed underground, water and gas in one trench separated by about one foot of soil. The water is put on the bottom on precompacted soil, which might have to be hauled in if it's rocky, and then a foot of backfill is put over that (which has to be without rock). Then the gas line is laid, and then soil over that and compacted again—all compaction being, of course, according to maximum compaction ratio. If rocks are in the soil adjacent to the gas line, they can easily be pushed through the plastic pipe of which the gas lines are made with traffic weights on them. So care must be used in that kind of backfill. The power and telephone lines are placed in a separate trench with the power on the bottom and the phone on the top. It is not so necessary that it be that relationship, but that's the way it was done.

Excavation for power and telephone lines was done by the contractor, I believe, but I'm not sure, according to an agreement between those particular utility companies and the contractor. I don't believe that was in the original contract, that is, the digging of the trenches, and the backfilling and the compacting. That was done in some cases, but not in all cases. Now the prime contractor did have to do the water and gas trench; however, actual laying of the gas line was done by the gas company. The prime contractor did the laying of the water lines.

Now the sewer trench was separate, and the sewer trench had only the sewer line in it. And extreme precautions were necessary in laying the sewer line because all lines which did not require pumping of the effluent uphill were run by gravity and the grades must always be such that there would be no effluent held back in the pipe. Also the sewer lines were made, in most cases, of transite

pipe, which could be damaged if there were rock directly in contact with the pipe beneath them or if rock were placed in the backfill in the first foot over the top of the pipe. So, first the trench must be covered with good soil before the pipe is laid; it must be laid to grade, and then backfilled first with good soil to a depth of at least a foot, and the water added and the material compacted where it is necessary to do so. And all of this required a tremendous amount of hand labor. The man with a shovel is an important part in all of this construction because many of the little details are not of such a size that they can be handled by mechanical means, so the man with the shovel in his hand is a great help in these cases.

Again referring to ecology, all these trees adjacent to the road, or in areas across country where trenches had been placed, were checked for damage. Bark was often removed by equipment traveling in the vicinity of the trees and before the job's accepted, these damaged areas were repaired. If the tree was damaged badly it was removed entirely.

Another consideration to ecology was given to an attempt prevent erosion from cut and filled slopes, so a seeding project was undertaken at a time which was convenient, that is, when the prime contractor had his equipment off out of the way. This seeding operation, I believe, was entirely separate from the contractor's items. Actually, it did not succeed too well in the areas I watched during construction, and I've made trips up there since that time and find that our dry summers are a little too dry to keep some of those perennial grasses alive. One other consideration which was done and probably would have to be done anyway in preventing erosion was to use rock riprap up the slopes where water services are placed for the individual lots. These sometimes go downhill

and sometimes go uphill, down the grade on the roadway or up the grade. And when those grades are steep, there's always danger of erosion because of the disturbed material. It cannot be compacted well on the steep slopes; therefore, rock riprap is laid for protection. Up at the top of the slope or at the bottom of the slope are the concrete boxes which are used to connect the water services with the water mains when the residence is built or ready to occupy.

One more requirement which is required of all contractors regardless of where they're building in the mountains or out in the flats, is final cleanup. Rubbish, pieces of brush, fragments of timber all must be thoroughly cleaned up and put out of sight before the job is done, which, of course, is a part of ecology.

Now I might describe how the contractor bids a job. Practically all the organizations wanting a big job built, such as counties, states, cities, and even the federal government, have studies made, surveys made, and their engineers do the designing, and plans are prepared and specifications. Contractors, after seeing these jobs advertised will come and make a payment for a set of plans and whatever specifications they need, and usually they have quite a little time before the bidding takes place. So that gives them time to go out on the job with their engineers, taking the plans with them, and look over every detail, particularly the excavation problems, with their engineers to figure costs. Some cuts can be handled much easier than can other ones [which] have to be blasted. They have to take all of those things into account and do it very carefully, and they also find out sometimes that rock cuts are going to give them a lot of trouble because more material comes out than they can possibly put in the plans as designed because of the swelling of rock. Then, too, they must examine gravel sources they're going to

use as a supply from the crushed gravel base and the borrow sources and figure the average haul distance from these pits to the job and the cost of crushing and so forth when it's necessary to do so. A study of rock formations and water courses which will require drainage and the cost of a lot of handwork where faulting might be found and water will drain from these small fissures— a lot of time is spent by these contractor's men sometimes in making this estimate. They actually use a piece of equipment now and then to try out how a material is going to be handled. Then when the time the bid is let, the low bidder, of course (who gets the job providing he's qualified), he must furnish financial statements. He will have to be bonded before he can go ahead with the work, bonded to protect the owner.

Now it is absolutely necessary that the contractor maintains competent engineers and accountants on his staff as well as competent superintendents and foremen for running the job. Competence and efficiency all the way down the line is also necessary. Good equipment, operators, and efficient laborers are a must, and equipment must be adequate in quantity and quality and must be maintained by efficient and trustworthy repairmen and lube experts.

The contractor's financial standing is always determined by the owner to see if he is qualified to bid. He must also be sufficiently well financed to withstand the delay usually one year after the job is finished before he can get his final payment. During the actual construction he will receive, periodically, only part payment on completed items. Usually fifteen percent is withheld for final payment one year after the job is finished. The one-year period gives the owner time to study and recheck anything which might not have been constructed in a proper manner. The finished product is not always what it's supposed to

be, in spite of good inspection. If nothing much shows up at the end of the year, why the contractor gets his money. Sometimes there are things which do show up and it costs the contractor a considerable amount of money to correct them. I will mention one particular place in the Incline area later on where this did take place and the contractor lost a lot of money, but he was a contractor, well financed, and could afford to do it. Usually there are only minor things left which were missed by inspectors during construction, such as small areas not thoroughly cleaned up or trees which were damaged and the damaged parts were not painted and were overlooked. But as a rule these are only minor items.

During the life of the construction, work conditions are sometimes encountered which could not be known or given attention in the plans. For example, wet areas, which need drainage, may be found in deep cuts, which were not known at the time the plans were drawn up. Or, rock cuts may produce much more excavation than can be used to balance fills. Engineers try to account for this, but without actually blasting they cannot always tell how the rock will break up. Also geological faults are encountered in deep cuts showing bad cleavage planes at times, and these are potential seepage and slide areas. Where those are encountered, sometimes it costs a lot of extra money to get them cared for. Corrections must be made when these things happen during the progress of the contract. The owner's engineer and the contractor must agree on methods to make these extra corrections in the change order, or an extra work order is prepared. Both the contractor and the resident engineer or inspector must keep accurate records of man-hours of labor, equipment hours, and kinds and costs of special materials purchased to do this extra work. Payment is then based on these actual

cost figures with a plus, which is usually fifteen percent. These items are all paid and there is no waiting for one year; it's paid at the time the special work is done.

A number of generalities have been stated in order to enable the future history researcher to receive a fairly good understanding of means and methods of construction in the middle and late 1900s. I must now get back to some particulars concerning these Incline construction projects.

INCLINE CONSTRUCTION PROJECTS

As stated previously, the three of us, two from Carson City, and one from Fallon, the "retreads," as they called us, all arrived in Incline about the same time around July 7, 1969. Ace Howard and John Stanley were assigned to Unit Number 3, that is, Project 69-3, and I was assigned to the Scotchwood Project 69-1. H. M. Byars of Reno was the contractor. The contractor's Incline office and storage yard was established on the north side of Village Road, about a thousand feet westerly of that street's intersection with the Country Club Drive, and was within the boundaries of Unit Number 3. Byars was the contractor on both Units 3 and Scotchwood and also on another small job [on] which none of us were inspectors. That was over at Tyrolian Village. There was no definite division of Byars work crews on these two jobs to which I refer. Crews were borrowed from the big job, Unit 1, from time to time and placed over on the Scotchwood job. There were laborers, pipe layers, and sometimes other equipment operators in various numbers depending on what was to do and the day it was done. Joe Krmpotic., the chief foreman, visited this little job almost every day, but an assistant foreman usually was there every day, and once in a while we had a visit by Leo Tuccori, the

superintendent. Of course, from time to time, the district engineer, Erik Beyer, would drop by and maybe call attention to something which might not have been specified exactly as it should have been in the plans, or ask questions about the procedure. But Erik was a busy man, and he had so many things to watch he couldn't be there all the time.

At the time I arrived, some of the work of this small Scotchwood job had already been partly finished, but actually there was some of all the various procedures to complete. Exception, I believe was the power and telephone; I think those trenches were postponed and were put in later. Thus, in the short construction time in which this little project was finished, that is July seventh to about August thirteenth inclusive, I had done inspection on practically all the procedures common to all the subdivision projects. I had this job pretty much all to myself, whereas on the larger jobs there were inspectors [and] each inspector might be assigned to a certain type of job. As a matter of fact, I really had a ball doing this, but it kept me busier than a cranberry merchant.

There were only twenty-two lots in the Scotchwood project and they were all in a single row adjoining the westerly side of Christina Drive, which was the only access road for these lots. There were no subdivided parcels on the east side of Christina because of the extra steep hillside; or I presume that's the reason—maybe someday somebody will buy it up and try to put houses up there. Between these twenty-two lots and Unit 3 there was quite an open space. There was a rough rocky area which had not been subdivided. These twenty-two lots had to be served by a sewage collecting main on the lower or westerly side. Much of it dug right through this huge rock pile. There was no sewer trench in the roadbed of Christina Drive.

One of the biggest problems encountered in this sewer trench was extremely rocky excavation. Much of the line pass[ed] through a talus area, where the blocky rock fragments were from about three cubic inches to two cubic feet in volume. The entire trench had to be dug about six inches below proposed grade, then partly filled with sandy bedding soil. This kind of soil had to be used to prevent rock from damaging the pipe. Before laying the pipe this was compacted where necessary. Hand labor is used an awful lot in laying pipe because with a sewer line the grade must be kept so that the flow is always downhill. You can never have up and down grades; it must always be down so that it will flow by gravity, but it must not have dips in the down grade. The grade does not have to be uniform as long as it is fairly certainly downgrade. Sometimes it can be only a very fraction of an inch or as much as ten feet in grade, but it enough so that the sewage will flow.

After the pipe is laid and joined, then, of course, you cannot use that rock fill over the top of it for the same reason—danger of cracking the pipe. So extra precautions must be used in the backfill, and it was a job to get it in there because it took a piece of equipment with tracks to haul it. The rubber-tired vehicles could not do very well over these rough rocks, so backfill of sand for at least a foot had to be placed over the pipe. Then, of course, this backfill had to be watered to approximately optimum amount of water and compacted by using whackers or vibratory compactors.

After a considerable length of sewer main is laid, including the manholes and backfills, flow tests and leakage tests are made. The making of these tests is the responsibility of the contractor. He usually has a crew, where he has several operations going on at one time, who does nothing but make these tests. One of

the tests is the “ball” test, in which a ball just slightly less in diameter than the pipe is pulled through a section and it must go through freely at all times. Then a leakage test is made by stopping up the pipe maybe between two manholes, as much as a thousand feet apart, with another manhole or two in between; and water is placed in there not under pressure but it’s filled up enough so that it has a slight pressure, and at the lower end there’s a measuring device to check the settlement in case of leakage. If there is leakage beyond a reasonable amount, and it doesn’t take very long to find this out, then the testers are up against the job of finding where is the leak. So then they shorten the distance between the water tests until they can pin it down somewhere between two manholes. Then to find just where between the two manholes they have to excavate and make repairs, they’d have to dig down alongside the pipe ‘til they find the wet place. This costs a lot of money, so it pays (and they know it pays) to do the job at the very best they can to start with. These repair jobs are extremely expensive.

Manholes, as shown on the plans, must be provided within reasonable distances all along a main. These distances vary depending upon terrain and sudden changes in direction of flow. In the case of a single flow line pretty much in a fairly straight line, a manhole with only two pipe connections is made. If a manhole served as a collection point, it may have three or four openings, or at times there’s what is called a drop inlet, where one line comes in from a higher elevation than the flow from a line say at right angles to that. So you have what is called a drop inlet. Usually a hole has to be dug in the upper part of the manhole. [It] has to be not through the top of the concrete to put that drop inlet in.

Now a manhole is an expensive piece of equipment, and the base is a solid piece of

concrete with a depression near the outer circumference on which will fit a concrete ring. And the number of openings are marked. The openings can't possibly correspond to the angles between these standard openings, so a new one has to be made and that is done by a concrete expert. Concrete is poured into the manhole and the channels are all made by an expert concrete worker. Some of the Indians are real experts on that.

Now when you're building a manhole, if it's a shallow one, you may have only the base cone. The cone is usually, I believe about three feet high and sometimes that's all you need. Other places you may be going through a cut fifteen feet deep [and] in order to keep the grade, if the manhole goes in there, you have to keep building up so the top of the cone is way up there to the top of [the] highway, or to the top of the ground when you're going cross-country. It's not a simple thing to set those manholes; they're very heavy, so you usually have to have a backhoe or some other piece of equipment on which a cable can be attached to the base of the various rings. Those rings are also made out of concrete. They're very heavy, and they're about thirty inches high, I think, and the manhole inside diameter is about just under four feet, so these heavy sections have to be placed there and they must be held in place by means [of] what we call ram's neck. Now ram's neck is an asphaltic impregnated substance. I don't believe it's peat moss; I believe it's something more like hair of some kind, but it's some kind of a matting, and this comes to the job in pasteboard boxes, which hold perhaps as many as eight, maybe ten of these strips, which are about two and a half feet long. These strips of material [are] protected from sticking to each other by pieces of paper. Now when the first concrete ring is placed on the base, this ram's neck is placed all around the place where the ring is to

set, and then, in order to make it soft enough, a blow torch is lit and it's warmed all around or sometimes they simply put kerosene or something over it and set it afire to warm it up and soften it. So that has to be done and it has to be done in such a way that there's ram's neck in every part of the joint, so they overlap these strips. Then there's this buildup [of] ram's neck used at every joint.

The top of the manhole, where it's placed in a roadway, is never brought clear to the point which will coincide with the surface of the paving; it's brought up to perhaps within a foot or so of that point and there's a temporary cover put on. Then later on, when paving is all done, the workmen have to come around and dig down to that cover and build up with metal rings, which are only an inch and a half or two inches thick, until the exact level of the pavement is reached. Then the cover is put in place. Now when these manholes are put in cross-country or across an easement, the cone can stick out of the ground. They are absolutely necessary because the name *manhole* means that you can get a man down in there where it's necessary to do the cleaning.

I am going to submit an inspection report covering manholes on the Scotchwood project.* This is not a final report, but a temporary inspection report which explains several things— whether or not the ram's neck was trimmed on the inside, whether the rings were properly grouted (sometimes the concrete rings have to be broken in order to put a pipe in there and grouting must be done); then, whether the cone is in position right, whether it's set to grade, whether these channels for flow are smooth and clean, and in case of paving there's quite a few more things to watch. This particular inspection report

*See Little papers, UNR Library

I am submitting was not a final report, but a temporary one. Then, payment for these manholes is based upon the height from the base up to the top of the cone and the final measurement, if the manhole is in the pavement, cannot be done until the paving is finished. However, all manholes for this particular job were cross-country manholes—that is, were in easements so their cones always protruded up above the natural soil.

There's one other important thing, in joining the pipe carrying the mains to the manholes you never attach a long length (which standard length is about thirteen feet), and there's a good reason for so doing. Only short lengths of about one and a half feet long are connected directly to the manhole; then the joint between that short connection is made with a long section. The reason for that is that these short stubs that go in there are in there tight [and] cannot be moved because they're concreted in. Now if the manhole should settle and you have a long pipe in there, it would break. But by using the joint out a foot and a half from it there's enough give in that, that there will not be a break. That is one thing that has to be watched carefully. Sometimes the workmen get careless, and if the inspector isn't on the job, it has been done, but then somebody has to pay for it later on.

It is always necessary to have machinery to lift these heavy sections. Some kinds of machinery can be moved around with ease; and laborers, of course, and the pipe layers help to get the sections in the right place. Sometimes, if they're not put in quite right, they have to be taken out and the whole job done over.

What are called *thrust blocks* are sometimes necessary even in sewer lines. They're always necessary in water lines. What we mean by a thrust block is that fresh concrete is poured on the outside of a curve in the pipe or at the

dead end of a pipeline at tames. The reason this is done, if there is a flow around a rather sharp curve, there's a tendency for the pipe to chatter or vibrate; but pouring, perhaps a half yard, or if it's a big pipe maybe one full yard, of Portland cement concrete around that, especially around the backside and, of course, let it cure—and by the time it is cured the pipe will, no doubt, stay in place without chattering. As I have said before, laying of sewer pipe requires expert workmanship. I think I've explained the reason for it.

The usual crew and equipment in laying sewer lines is first a backhoe to dig the trench. You are not allowed to dig trenches way ahead and then come back and fill them in, on account of the danger of livestock or people falling in them. So you keep your digging, as much as you possibly can, right along, just ahead, of the sewer crew. A grade setter must be present to check that grade, and he is always working out ahead setting his line out ahead of the backhoe digging the trench. Then he comes back and checks down when the backhoe is digging to about the proper grade. That isn't the end of the grade because some of the laborers, particularly the pipe layers, have to take shovels and fine finish it before the pipe is put in, then check the pipe with a level to see if they have the grade on it before it's fastened to the joint of the remaining pipe. Laborers always must be used and they have to know what they're doing to help with the grade, help get pipe in place, get the manhole loads unloaded with cable, and do a lot of extra jobs. Usually the pipe crew consists of the operator with the backhoe, the grade setter, two pipe layers, and as many as two to three or four laborers, depending upon the size of the pipe and how fast they want to do the job.

The backfill is important; there's usually a man on a loader to do the backfilling. And

again, all the backfill must be watched by the laborers for presence of rock, and the first one foot of cover over the pipe must be fairly free of all rock because when that is compacted, sometimes that rock gets close enough to the pipe so that it can be pushed through. In the compacting, the water truck is also important. It must be on the job when needed, especially in summer weather when it's dry, to get the water on the soil; and that amount of water can be pretty well estimated by a good inspector who's had experience with it and then by the workmen themselves, but it must be near the optimum amount to get the maximum compaction. That maximum compaction is specified to ninety percent of optimum in some cases and ninety-five percent of optimum in others. In the main road it is usually the higher figure, ninety-five percent.

Another job for the inspector is to get out ahead of the work when he can and set stakes for services. These services come from wyes placed in the line up to the property line. If you do put stakes out, they should also be referenced; that is, the wye should be referenced back to the distance from the manhole, in case the stake gets removed. Another way of doing that, where there are a lot [of] trees handy, is to take a measurement from one tree back to the wye and another measurement to an adjoining tree. Then where you come back with two tapes, you can cross those tapes with those distances on them and dig down, and that's where you'll find the wye when you get ready to put the laterals out. Backfilling, of course, is most important in the pavement, but it's important also out across easements and across country because it prevents settling of the manholes and keeps the pipe in place.

I have already said that the trenching is not supposed to be too far ahead of the pipe

laying. If it is, and something breaks down and that job cannot be finished before dark, here's all this wide open trench and it can be dangerous, especially in heavy traffic. So, as a rule, the backhoe digging the trench is kept just barely ahead of the pipe layers. Of course, sometimes the pipe layers have to wait because digging isn't always easy, and you find rock. [Then] you have to stop operations and call for the compressor and drill rig, or where you have [a] pretty large pipe, you usually get a one of these huge compressors that can drill two or three holes at one time; but in the small areas, where you're using only a six-inch pipe, you usually get a little compressor with its hoses and drills. After the drilling, you have to have a powder man, who's an expert on powder, do the shooting. Crews are kept out of danger until that is done. In the meantime, there is always some kind of labor jobs nearby where they can keep the men busy. A good foreman usually figures that in advance because he never knows when he's going to have to stop the situation and have them doing something else. You very seldom see a contractor's good foreman watching laborers just stand around.

I have not mentioned the kind of sewer pipe used for the mains and laterals. In the old days they used to use what is called *vitrified clay pipe*. Vitrified clay pipe was immune to acids or alkalis and was always used. However, it was very brittle and was easily broken. Someone came along and found out by mixing Portland cement concrete with a very small aggregate with asbestos and making pipe by centrifugal force, what is called *transite pipe* could be made. Transite pipe was used on the sewer work here.

Transite pipe can also be used in water lines where there's considerable pressure, but the walls on the transite for water lines [are] much thicker than for the sewer lines, because the sewer lines as a rule by gravity

do not have the pressure. However, where sewer outfalls all collect at a certain point and from that point the material must be raised in elevation up to a treatment plant, there is pressure on that kind of a line, and a little thicker pipe usually is used. The transite pipes are in different lengths but the standard length seems to be thirteen feet. I am not sure why that figure thirteen was used, but that's the way it is. Of course, there are all kinds of lengths in between used for special purposes. Then there are curved pieces used for cleanouts at the end of the line where there's no manhole. They, too, are made of transite.

Now, returning to water lines for just a little while, water mains, of course, must be placed so they can serve all these various lots. Then water lines or mains must be placed where you're pumping water from Lake Tahoe up to the various storage reservoirs, and water mains must be placed from the reservoir downhill to these various areas which have been subdivided. Now, when this is done, the same precautions must be used in trenching and compacting for the water lines; however, there is no reason to keep a steady grade with the water lines, because they're under pressure anyway in all cases. So you do not have to be so careful about keeping grade on a water line, although a grade is set up. Usually, they are always put at least three feet deep where [they are less] susceptible to freezing. When gas lines also are used, they can be placed above the water line, but there must be one foot of intervening space between them, and this material must be well compacted before the gas line is installed. Then, of course, after it's installed it must be compacted again. Except for cross-country runs [al]most all the water lines are placed in the pavement, and where there's gas, the gas lines are placed right in the same trench. Where the electrical and telephone lines are placed underground,

those two are also placed in the same trench with the power line on the bottom and the telephone line on top.

In discussing drainage structures, something should be mentioned about the kind of materials used. All little streams or wet areas must be drained away from the highway to preserve the surface. For fairly good-sized streams what are called RCBs, or reinforced concrete boxes, are used. Of course, they're made of concrete with reinforcing bars; they're a regular rectangular box. And they must have inlets and outlets (wings) against the cuts above and in the fills below to prevent erosion, and there's a little outflow area also paved to prevent erosion.

Then there's what we call CMPs used for smaller drainage water areas—corrugated metal pipe (that stands for CMP), and that is used in place of smooth pipe. And you might want to know the reason why, but I think it's well known to everybody. By corrugating a small-gauge pipe, it will have the same strength perhaps as a pipe made of metal with three times or four times the thickness. So you use a lot less metal by corrugating it, and you use different gauges for different size pipe. For example, you use a heavy ten-gauge if you're going to put in a fifteen-inch diameter pipe. You might use only a fourteen-gauge if you're using just a ten-inch pipe.

In all cases, the steel in the corrugated metal pipes is covered with a zinc coating; it's called *spelter* coating, and in the amount of two ounces of zinc per square foot of pipe, and tests are made in the laboratory to check that. However, the zinc coating will oxidize, but that layer of oxide protects the rest of it and it protects the pipe from rusting in ordinary soil. However, if the soil is acid or if the soil is alkaline, it's a horse of a different color. The zinc will be affected. Therefore, it has been found that by coating the corrugated metal

with asphalt you can use it in a good many situations. Up at Lake Tahoe, it has not been necessary to coat it with asphalt because most of the soils there are neutral. However, all state Highway jobs in the state of Nevada and many other places use the coated corrugated metal pipe in their drainage structures. [In] some places[s] the alkali is so bad that even that did not suffice. I might just mention this, if I didn't mention it when I was talking about the Highway Department—in those cases across the alkali lake beds where it's necessary to put equalizers under the road (you have water on both sides of it), sometimes concrete pipe [is used], made very dense by centrifugal force, and coating that with several coats of asphaltic material. Concrete itself is affected by strong alkalis, but having that protection on the inside and outside of the pipe is really better than painting on corrugated pipe.

In some areas on this little job, seepage areas were found. Seepage and swamp areas always require special treatment. There were no swamp areas as I recall, at least no bad ones, on this Scotchwood job, but we did find several seepage areas. Some of those areas were of such nature that the seams were filled with clays [and] the elevation of the water was quite high. So we had to put rock drains leading from those cracks over to perforated corrugated metal pipe drains to collect it and carry it across the road. These rock drains usually were made from rock three quarters of an inch down to about Number Four.

The one place I mentioned where there was faulting in seepage areas on the Scotchwood, it was necessary to keep the equipment time and labor, and prepare a change order because this was extra work. Then of course, the cost of the extra drain rock and the extra perforated metal pipe had to be taken into consideration. In some places where you're trying to drain an area, you can use the rock for the bottom

and then put the perforated metal pipe, which has holes in the sides to collect the water, and then it will run out under the road into a drop inlet or something like that. That had to be done here. I believe this one particular job, as I recall, cost about eleven hundred dollars extra counting the men's time and the materials used.

All the inspectors are required to furnish the district engineer with a daily report of their work. Some of them do it quite well, and I know that some of them do not. It means a lot of writing and you cannot carry a big notebook along with you. Usually you have a small pocket notebook and take notes on all the operations and then when you get home at night, rewrite out a regular report. And I had the practice of keeping a carbon copy, so in case anything happened to the original, I'd have an extra. This report or daily diary and all the others that inspectors furnish always show the following: the project name or number; and the report number and date and the time of the work period; and the classifications of crew men and the number of each; the types of equipment and time worked by each piece of equipment; and finally, the chronological account of the day's operations.

The contractor apparently desired to finish this little Scotchwood project as quickly as possible, as it was tying up some equipment and labor, which was needed on the big project on Unit 3. Thus, whenever possible several operations were under way on Scotchwood concomitantly. Since the sewer lines, however, were all below the road and out in easements, that could keep on indefinitely without regard to what was done up on the road. They were all below the lots and there was no interference from that part. The water and gas and any other utility line, of course, if they're in the road, could not be put there until the fine grading was done, and base

course could not be put over the top until they had been installed and tested. Construction had to be kept ahead of fine finishing of the grade; that is, the pipelines had to be laid, and the base course material, however, was being placed right behind the fine finishing, so everything was seemingly going on at once and I was really busy. No surfacing was attempted, until the base course was pretty well finished. Nevada Paving was hired as the subcontractor by Byars, to construct the base course and the asphalt paving. Therefore, there were a few days where two contractors' crews were on the job at the same time. Each contractor might have had two different crews at work, keeping the engineer inspector on the run.

The base course to be placed on Christina Drive was shown on the plans and specifications as crushed gravel three quarters of an inch maximum size. However, since there was an available supply of decomposed granite in the vicinity, the subcontractor's superintendent, Bob Smith, and Erik Beyer, division engineer, agreed that a 60-40 blend of crushed gravel and decomposed granite would serve satisfactorily. Therefore, a change order was prepared to so do. I was not fully in agreement with this because the mixing was to be done on the grade with a blade and I knew that would not result in uniform product. [It was] a method which would produce variable results at least. However, I realized the traffic loads on Christina Avenue would be very light and that the decomposed granite-gravel mixture, properly moistened and compacted, no doubt would be satisfactory underneath a good paving.

The depth of the base was pretty much left to the inspector. There were no tests made in advance like the state Highway Department would do with respect to the soils; therefore, the inspector's judgment had to be used. For

example, I used fourteen inches of base where there were some bad clays and rather moist soils, and reduced it to five inches where everything looked to be okay. The width of the base was thirty-three feet. Tests of the base for gradation and relative compaction, as well as compaction tests on sewer and water trench backfill, was to be done by commercial testing firm, Harding, Miller, and Lawson. George Griffith was the sampler for this company, and he made periodic trips to Unit 3 and to Scotchwood, or special trips for special reasons for emergencies. However, not many of the latter were required. George was the son of George Griffith [Sr.], who was for many years employed by the state Highway Department as resident engineer, then by Dodge Construction as an estimator and engineer for that company. Later, he again worked for the state Highway Department and was finally appointed as assistant state Highway engineer, in charge of all field operations. I had worked very closely with him. He passed away, I believe, in 1966. Depth checks and width checks of base and paving were made by the job inspector, who also had to set stakes for widths; however, that job should have been done by the contractor, but sometimes he did not get it done.

* * * * *

To better illustrate some of the various operations of construction and duties of the engineer inspector, I will submit carbon copies of some of my daily diaries.* In so doing, I will have to mark over some of the illegible words in the faintly impressed areas of the sheets, which came from using poor carbons. This will save [the] time it takes to recopy the entire reports.

*See Little papers, UNR Library

Fortunately, for this attempt to describe with some degree of clarity the somewhat complicated construction operations, I had retained more than eight hundred carbon copies of daily reports made on projects on which I was an engineer inspector for about six years, after leaving the Highway Department. By these daily diaries, I describe this small 1969 Scotchwood project quite in detail so that similar details in the other Incline projects, which are much larger and which took place from 1969 through 1971, will not have to be emphasized. The similarity carries through not only in construction details, but in composition of personnel classifications, equipment, and construction materials. Differences are principally in quantities and in different people occupying similar classifications in the several projects.

While most of my inspection duties from July seventh through August twelfth, had to do with the Scotchwood project a few hours in each day in August were spent on a sixteen-inch water line on the easterly portion of Job 63-9, that is, Unit 3. This particular water line leads from a huge tank adjacent to Fairview Road to the new golf course, which was under construction in the midsection of Unit 3. The pipe used was thick-walled, ball and spigot transite, Certainteed brand, fluid tight. The extremely heavy thirteen-foot sections were handled by a Poclain backhoe with cable attached to the bucket. Of course, there had to be laborers and pipe layers on this job also.

Where this sixteen-inch water line was laid in semiswampy ground, crushed gravel had to be hauled in and placed in the bottom of trench to a depth thick enough to withstand the weight of the pipe so there would be no settlement. Uneven settlement could affect the joints causing leaks. Because of the critical nature of this pipeline, all hands among the contractor's bosses spent time on the job. Leo

Tuccori, superintendent; Joe Krmpotic, chief foreman; and some of the assistant foremen were there from time to time. Also Erik Beyer spent some time on that particular project.

This short Scotchwood job, while interesting, was handled in such a hurried manner that several operations in different parts of the project were going on at the same time. Also the job was split with prime contractor (Byars) doing the pipelines and the subcontractor (Nevada Paving) placing the base course and doing the paving. On larger projects there were usually three to five inspectors, thus dividing the work classifications. On this job I had responsibility for everything under the overseeing, of course, of District Engineer Erik Beyer. The last few days work on Scotchwood involved construction of manholes, cleanup, and putting finishing touches on the paving.

I believe the copies of daily diaries I have included will describe all of the several operations with attendant problems in detailed form. I have also attached one copy of a preliminary inspection of manholes. I have not given much information on the paving, but the paving, of course, followed the base course and that was laid with a regular finishing machine in two, and sometimes three, passes 'til they got the full width paved. And in so doing, of course, the inspector must watch the paving for thickness variations and must watch the operator. Fortunately, however, the operators were well experienced and the paving foreman was well experienced and things went along quite smoothly in the paving operations, except in one area where there was a rough spot in the base grade and the pavement was too thin and had to be worked over after the initial coat had hardened.

During the summer of 1969, we had a visitor, my oldest grandson, Mike Eidson.

He came, I believe, early in June and visited us for a short time. Then we took him down to daughter Joan's cabin at Bear Valley, and he visited with Joan and Ben Remington and their family. We came back home and left him and he went on down to Stockton and visited with our oldest daughter's family. He thought he would be able to find work down there but no work showed up. So he came back up to Carson City and at that particular time the golf course in Unit 3 was being constructed, and I happened to get acquainted with the manager who was managing the thing for Boise-Cascade and he got Mike a job. I've forgotten the manager's name. But he could ride up there with me, of course, and come back with me. The only trouble was he worked eight hours and I worked usually ten hours, so he had to go an hour early and wait another hour for me to come back, but Mike did that and he did very well.

Kind of an interesting thing happened—of course, I always took my lunch (we had a half hour for lunch on these jobs) , and we bought another lunch bucket for Mike, and another water jug. And the first day Mrs. Little made the same kind of lunch for Mike in the same quantity that she made for me, but when we got home that night Mike said, "Gran, you know I just can't make it on one sandwich and a few cookies. I just get so hungry." So after that Mike usually had three sandwiches and filled his lunch bucket.

We tried to entertain Mike when he was here. We used weekends to take him out. He liked to swim and he was an expert swimmer so we took him out to Bowers, and we took him around to show him some of the historical places. I recall one trip we made about Labor Day over to Fallon. I play in the Reno Municipal Band and the band was playing at Fallon for their Labor Day celebration, so we put Mike in the car

and took him out there. So we thought we'd show him a few things, on the way home, of historical interest. We took him to Fort Churchill; then we thought we'd go to Virginia City via the old road, which takes off east of Dayton—it goes up a canyon. And there were some new buildings in there, and there was one interesting looking building; I thought we'd go by there and see what it was. I looked up and the sign said "Love Ranch." Uh-oh! [Laughs] I don't know whether Mike noticed it or not but I moved along and I wondered about that building. But I had thoughts that it must be one of Joe Conforte's, or someone like Joe, one of his places. But Mike thought he could find gold in that little canyon that came down from Virginia City so I had to let him get out and do a little prospecting. We went on to Virginia City and then on home.

This incident, about that love business that was on that sign, I happened to tell to Bob Arkell one time, and of course he's with the power company, and he says, "Well, you know, didn't you go and look and see what the sign said on the other side?"

I said, "Of course not. I couldn't do that with Mike there and my wife so we drove on by."

"Well," he says, "I surveyed through there. You know what that sign says on the other side?"

I said, "No, I do not."

"It says, 'Bye, bye, Baby!'" [Laughing]

Our grandson Mike had joined the Navy, but he didn't have to report until I believe it was October, so he stayed here until that time and then went back to Haleyville, before he reported in the Navy.

On August 13, 1969, I started at seven o'clock on some special work on Scotchwood, which really wasn't all completed at the time. The loader bucket was being filled with

handsize rocks to place along critical areas on the banks, which might be subject to erosion. Pipelines would go up the banks on services, sewer services and water services both. And if the soil had a tendency to be easily removed by rain water or snow water, some protection had to be put in there, and the same was true on certain outfall ditches or ditches coming down to cross the road. And these cobbles and larger stones, man-sized stones we called them, were placed in there by hand, and in rather critical areas which were quite steep. They were covered with sand and cement grout to make them solid so the water could not get through.

This particular day, while we were working on some concrete pours, a welder came on the job about eight-fifteen to cut and adjust reinforcing bars holding drains solidly in place, and also to weld attachments to drop inlet rings and to weld angles on corners to close the surface of square boxes. He was all through by nine-fifteen A.M. Concrete was poured in several places and all fresh concrete [and] freshly grouted ditch and bank linings were covered with Visqueen to keep [them] from drying out while curing. Laborers were removing fill around a manhole which had the slope of the cone set in the wrong direction. That slope should always be arranged on the downhill side; otherwise when they're in the manhole to do work or to run cleaning rods through, so if the cone is set in the opposite direction, they simply couldn't do the work. This one had been set the wrong way and I don't think I was on the job at the time that was set, but that had to be dug out and new ram's neck put on and reset. Then everything had to be cleaned and the area recompacted.

All these manholes on Scotchwood, by the way, were down in easements; none of them happened to be along the road. Then covers were put on the manholes, the cone of

which always protrudes above the surface on easements, which it can't do on the roadways. It has to be absolutely even with the roadway in those cases. There were six manholes A-1, A-2, A-3, A-4, C-6 and B-3, and they were all fixed and were okayed, except that A-3 had to have a cast-iron ring reram-necked, because there was a leak in it. The laborers finished the manholes and cleared the dirt away from trees adjacent to the sewer lines. As stated before, all sewer lines on Scotchwood were in easements and there were none whatever up on the highway except down at the intersection with one of the roads coming in from Unit 3, but that work was done on Unit 3 and not on Scotchwood.

There was more cleanup done that day and bad spots in the paving were patched, and on August fourteenth I moved my operations up to Unit 3. On Unit 3, Project 68-3, I joined John Stanley and Ace Howard and Merl Sawyer and another inspector whose name I have forgotten; however, Merl Sawyer I had not seen very much on my job that summer. His principal job was to inspect the sewer lines and water lines.

This one man whose name I can't remember was supposed to be on a vacation. He'd come up to the Lake with his fishing boat which he kept on top of his camper to do some fish[ing], but he couldn't resist nosing around when he saw construction going on because he was an ex-construction man. So Erik Beyer, the district engineer, quoted him and he decided he would spend some time inspecting, which he did and he was a good one. He just simply couldn't stay retired when he had a chance to do something else. Maybe he was as bad that way as I am [laughs]. We could always tell where he was or approximately where he was if we could see his outfit, because here was this pickup with a boat upside down on top of it. I never found

[out] about his background for sure, but I'm quite sure it must have been engineering. I presumed he did some fishing on weekends when he wasn't working.

Considerable amount of sewer and water line construction had been under way during July and early August on Unit 3. this work was done immediately after preliminary grading was finished on a particular area. The primary grading was not done carefully because of so many trenches [that] had to be dug in it, and if you didn't do it carefully in the first place, you'd have to do it all again. So after all the lines are in— the sewer, and the water, the power, telephone, and gas— and they're compacted and tested to see if they're in working condition, then is the time to do the finished grading.

Sometimes sewer trenching was going on along a certain street at the same time the power and telephone people were putting in their underground lines. And [on] some of these roads there were even three trenches: power and telephone in one, with the telephone line on foot above the power line; the water and gas in a single trench with a water line at least three feet in depth to prevent freezing and with the gas line a foot above that. And, of course, the crews were all at work sometimes in a single area. That was a very rough road to travel in a regular car like mine. Partly finished trenches with the rocks all over the place made it rough going. Traveling was so bad during some of these times, I left the car in the nearest smooth spot I could find and carried my tools and measuring devices with me. You must always leave your key in the car in case somebody had to come along there to unload some material or to do some work, so they can move your car.

My first day on Unit 3 was spent watching watering and backfill trenches in the lower

part of Golfer's Drive. The Golfer's Drive name comes from the fact that a small golf course, a nine-holer, was built in Unit 3. There were eight laborers, two equipment operators, two pipe layers, a water truck driver, and one boss of laborers, the great Lazo. The Poclain backhoe was digging the trench and a loader was backfilling the trench, assisted by the laborers. You must always have a crew of laborers in laying sewer trench. You could not do the work without them because fine finishing the grade and the picking up pipe and carrying it to the trench and doing those kind of errands you must have labor there. The power and telephone people laid their own cables, but the trenching and backfill was done by Byars workmen.

On this date, August fourteenth, I had conferred with Ace Howard, who was up ahead watching insulation of corrugated metal pipe and some of the pipe laying. In addition to observing watering and backfilling compaction on the sewer mains, I observed the installation of four services to four lots adjacent to Golfer's Pass and made measurements of the service line for payment. I must say at this time, although there were many lots in these subdivisions, in very, very few places had construction of residences commenced, although many of the lots had been sold. Sharp and Krater, the commercial testers, had a man taking compaction samples on backfill. One area was found not thoroughly compacted, and the whacker was used for three more passes 'til proper compaction was obtained.

A manhole with a poured base (that is, the base was arranged by pouring fresh concrete) was constructed at Station 43 + 00. The upper part of some of the parts of the sewer trench was compacted by wheel rolling with a loader with the bucket filled and elevated to increase pressure; that is, the upper part of the trench

was filled. You would not try to do that in the lower part of the trench. The lower part of the trench was always compacted by a whacker or a vibratory compactor.

(This first day's inspection by me on Unit 3 has been explained in detail but I certainly will not explain details for every day on these several projects. Rather I will skip most of the details and use more generalities—otherwise the future historian will tire of such endless details and will give up his pursuit. I will submit now and then for the University of Nevada Library files a copy of my daily diary, which can be referred to by history researchers, looking for special details.)*

August fifteenth, I observed laying a twelve-inch sewer line and laterals to adjacent lots plus the watering and compaction. Equipment was the usual plus a Caterpillar with crane to lift and place the heavy pipe sections. The smaller sections such as six-inch pipe can be handled by two men, but the [pipes] eight inches and larger must always be handled by a machine. An assistant foreman, Pete Thomson, was in charge along with labor boss, Lazo the Greek.

The next several days were spent by me on water mains, sewer manholes, placing of fire hydrants, and pouring concrete anchor blocks and thrust blocks. Such blocks must be poured around crooks in pipe and along fire hydrants to keep them steady when water is turned on. Otherwise they would chatter and loosen and would have to be replaced.

Water services to the lots were not placed immediately after laying the mains because the gas line had to be placed one foot above the water mains. The inspector spends a lot of time taking measurements in sewer and water and the service lines to the lots, and measuring manholes, collecting scale weights from gravel and asphalt truck drivers, measuring lengths in diameters of drainage

pipes. These measurements and counts of personnel and equipment are kept in pocket notebooks which are easily carried around on the job. Then the daily diary is made out at home in the evening or early morning the following day. This requires extra time, but I never counted such time for pay, as I believe it was part of the job information which should be furnished gratis by an inspector or engineer regardless of whether or not he's paid by the hour or by the week or by the month.

Several of the inspectors of these jobs were professional engineers. According to Erik Beyer, the district engineer, the professional men could be depended upon to furnish daily reports on time, but the nonprofessional inspector, while efficient and knowledgeable in his work, had a tendency to delay these reports and sometimes would submit a full week's report several days after that particular week had passed. I have been present when Erik had to chew out these people [laughing].

Pay quantities should be shown each day they are measured and submitted as soon as possible so that we could [make] estimates, and be checked with the pay quantities submitted by the contractor. Sometimes the inspector will, in addition to his daily report, prepare a summary of pay quantities over a certain area in order to check with the contractor's quantities. The contractor's men had a tendency to count pipes, but they sometimes forget to indicate the lengths of the pipe, while the inspector will take out his tape and will measure the length of the line. If the two measurements do not check, a compromise is reached or a conference is held where a settlement is made.

I am submitting one of these reports, which probably should be typed up and put

*See Little papers, UNR Library

right in with the rest of this; otherwise it may never be referred to.* This is a report of one day's measurements on some of the pay quantities which the payments are made. I don't know how legible that is but I think most of the items on there are legible. This contains several items, such as the length of pipes, and there's water mains and the valves, tees, elbows, fire hydrants, connections and so forth, and water lines, plus a sewer manhole in this part of Golfer's Pass, and one on Lichen Court. This should be attached directly to the typewritten report as I stated before.

All water lines when placed must have chlorine disinfectant pills attached at the inlet end of all the longer pipes such as the twelve- and thirteen-foot lengths. This, of course, is a health measure which more or less insures disinfecting the lines from probable contamination during handling and tamping of the pipe. The large pipe have more pills in them than the smaller pipes. Initial filling of the pipelines for purpose of testing for leakage will dissolve the pills and disinfect the entire line, at least theoretically. This saves separate flushing treatments with disinfectants after the pipe is all completely laid. As a matter of fact, the Lake Tahoe water which furnishes the sole domestic supply for the Incline area, is so nearly bacterial free that very little chlorine is used for treatment as it is pumped from the Lake to the big storage tanks. Checking the pipe sections for disinfectant pills is another item for the inspector to watch. A good foreman always sees to it that a supply of pipe sections is placed alongside the proposed sewer trench, but far enough removed as not to interfere with excavating the trench.

After the gas lines were placed above the water mains in the trench and the earth fill compacted, the next operation for the water lines was to place the service trenches across the road to -the lot owners' property lines.

Sometimes this was done one line for each lot, but more often where convenient to do so a one-inch service line was laid up to the lot line with a wye placed in the line so that one side would serve one lot and the other side the adjoining lot. This saved extra trenching and then the owner when he's ready to put in his services to the house, of course, will make the proper connections and the water company or whoever takes care of that will install the meter in an area either next to or right on the house.

Concrete housings made of rectangular boxes were provided at property lines for easy access for the owners to install connections. All lines had to be sufficiently deep to protect from freezing; therefore, sometimes there was as many as three of these boxes one placed on the other. In order to easily find the connection valve for a service line at the water main, reference points were marked at the site of the road. Sometimes when trees were available, stakes were nailed to two trees and the distance from each stake was measured to the main. For example, one such measurement might be thirty-four feet and the other twenty-nine feet; thus by using two tapes from the tree back to the buried main, the point where they intersect would be the location of the valve. Then this is not done, and no mention is made of it, sometimes a further measurement is taken from one valve in the main to another valve. It's a good idea to have an extra measurement like that especially if you're using stakes. Sometimes children come along and they seem to like to have a contest to see who can pull out a stake that's been pretty thoroughly driven in to the ground. They usually succeed [laughs].

*See Little papers, UNR Library

Sometimes the contractor might have a service crew working just a few hundred feet back of the main line crew. In sewer lines where the wyes and the manholes are all buried, the manhole locations and the wyes are similarly referred. Measurements from manholes along the sewer mains to each wye is also measured for further reference in case the tree markers or stake markers are destroyed.

Sometimes markers for the ends of sewer services on property lines are marked by driving a redwood stake, which is usually about four feet long, just at the end of the pipe. Those are too hard for children to remove; however, a careless blade operator can destroy them. The instrument used to push those down is usually a loader with his bucket full of earth. He simply puts that bucket up on top of the stake (someone is holding it) and lets the weight of it push the stake down into the ground. And usually it doesn't leave more than about six inches of the stake exposed. However, some of those loader operators fail to see that six inches of stake when they're working along the grade. In sewer services, the service is usually placed at right angles to the main. This gives a supplementary means of finding the connection point in case the primary markers are destroyed.

To take measurements for a manhole to a wye in the sewer main, find the buried manhole location by use of a metal detector, because the top of the manhole, even though it's buried in the street, is of metal. I think I've explained before why this must be done. You cannot put the cover of the manhole clear up to the what would be top of the paving. You get the base course on and compacted, and the paving on and compacted, then dig back down and find the manhole top and put metal rings on to bring it up to the proper level and then put on the cover.

There's one gripe inspectors have with surveyors—you must often know what the stationing is along the roads. Surveyors have the stakes out and they can be read, but the stationing is always on the backside, and here the stake is up the top of a fifteen-foot cut and maybe downhill fifteen feet to the fill. You've got to walk up or down to see what the station is on the back of the stake. Once you find one, you can count ahead and find your other stakes. The front part of the stake is full of information about cut and fill and so forth.

The latter part of August the writer had as many as three operations to watch in a single day, all of them going at the same time. On a few of the days he went back on the Scotchwood project where water main valves on the hill were being raised to the top of the finished paving and a crew of two men were completing backfill by compacting it on water mains. Several mains [were] found to be leaking and had to be reexcavated and reset and refilled and recompacted. These were very busy days for all the inspectors as well as the contractors crews.

John Stanley was taking care of the grading and the jacking of a large steel pipe, I believe four feet in diameter, under the Mount Rose highway at the intersection with Country Club Drive. This pipe was to carry the large water main from the pump house at the Lake to the upper water tank and, of course, another water main leading from the Lake to the tank. The state Highway Department, of course, would not allow the surface of Mount Rose highway to be disturbed; therefore, this jacking operation had to take place and it was a tough one. I believe that took about three weeks for the crew to jack that pipe through because of finding rock and boulders. It was a really rough job. The Highway Department kept a man right near the area who was on the job every day watching to see that the

operations would not disturb the highway traffic. Ace Howard was watching installation of reinforced concrete boxes and corrugated metal pipe—that is, for drains—also checking compaction, and took care of some of the water lines. A Mr. Wiseman who had been borrowed from Clair Hill company for a time was also on the pipe laying operations. Groundwater made problems in laying pipelines. Springs and some small swamp areas required large quantities of crushed rock, three-inch maximum size placed in the bottom of the trenches, then covered with a layer of bedding soil to keep the pipe away from sharp rock on the sewer lines before laying the pipe. Water lines could be laid directly over the rock and could be covered by it as those lines were made of cast iron, usually. However, if they were made of transite pipe, they too had to be bedded in the soil and covered with soil for at least the first foot. Most of these water problems with wet places were not anticipated by the designers; therefore, change orders or extra work orders had to be prepared, and the inspector had to keep count of equipment and laborers I time. As stated before these kind of jobs were usually paid for on the basis of time spent by equipment and men with a fifteen percent added.

Size of crews on my work areas varied depending on the type of work. On pipeline work there was always a foreman or assistant foreman and sometimes a labor boss, usually Lazo. There were always two pipe layers, two or more equipment operators, and three to six laborers, depending upon the area in which the job was being done. Pete Thomson and Jim Roach alternated as supervising foreman.

Sharp, Krater and Associates of Reno handled the testing on Unit 3, most of which had to do with density and compacted fill on grade and in trenches, but some testing

was done on concrete pour and gradation of crushed and screened aggregates and on some samples of decomposed granite. The inspectors observed as much of the sampling as they had time to do while they were on the job; that is, they watched the men hired by the laboratories to do this sampling. Compaction testing was not always watched too closely, but these testers were technicians and they knew what they were doing.

On September fifth, I spent some time observing the pouring of a base of a deep manhole at Station 22 + 62 on Golfer's Pass, to accommodate a gravity system water line. After the base was poured, a four and a half-foot ring was set in place. Other rings would be set in several days after concrete had set sufficiently on the base ring. This particular day was as busy as any, but I got into some details which I will not describe thoroughly at this time. There are quite a few details with respect to constructing manholes which must be carefully observed not only by the contractor's men but by the inspector. For example, if the ram's neck is skipped, the manhole will leak, and there are a good many other things to watch besides that.

This day also, I showed Jim Roach, the foreman, drawings of a blow-off valve which would involve special workmanship. Air blow-off valves had to be installed in the water lines, and I spent some time with him on tie-ins for sewer services for one of the six-inch mains. Testers obtained a low value of 87.5 percent compaction on a Titleist Drive trench above the water line. The foreman had the trench rewhacked and a good figure of 93.5 percent compaction was obtained.

One problem in extra warm weather was getting the backfill soil sufficiently wet to obtain the ninety percent compaction required for the subgrade. Water trucks lost time in refilling trips back and forth, and some

dry places had to be wet repeatedly, before they would compact properly. This was especially true where fine soils were encountered. The coarser soils did not give so much trouble, as they absorbed water rapidly and required only about eight percent to secure maximum compaction. Finer soils would require twelve to sixteen percent and are slow to absorb the water. The water sometimes is treated with a wetting agent on these fine soils which gives much better distribution.

On September ninth, Ace Howard was watching both pipe laying crews, and I covered backfilling and compaction and processing of bases for several of the manholes. [I] also observed one small crew laying four-inch sewer laterals from six-inch mains to property lines. These trenches with less width than those for mains were dug by the smaller Case backhoes that required whacking and thorough compacting in the roadway. Outside the roadway the compaction was not so important, but in steep banks rock riprap had to be laid later on to prevent erosion. These procedures—pipe laying, “shading” as they call it, and backfilling, the construction of manholes, underdrains where necessary, and pouring concrete inlets, outlets, thrust blocks, head walls on corrugated metal pipes, and constructing reinforced concrete boxes—continued all through September and in October.

After all roadway trenches in a particular section were completed, John Stanley inspected the fine finishing of grade in preparation for base course, which was to be a mixture of the native decomposed granite and about three percent Portland cement. This base is called CTB, that is, cement-treated base. It is not as hard as Portland cement concrete, but has just enough cement to destroy plasticity of any clay in the soil material, and it hardens sufficiently after being spread to

grade by blading to withstand light traffic. Heavy traffic would damage it; therefore, the asphaltic surface usually is placed over the base just a few days after it has been laid. This placing of cement-treated base is deferred until warmer weather, which is better for hot paving operations. Nevertheless, when the contractor is pressed to do so, he may be able to do this in the colder weather, but what has to be watched is that the freshly poured soil cement is not subjected to freezing.

Very often it was necessary to work as late as fivethirty or six P.M. and sometimes on Saturdays in order to keep continuity of all operations as smooth as possible. More time was required on pipe laying, building manholes and concrete structures than was required for fine grading and laying of base and surface.

Water lines, that is the service lines, usually were made of copper. Copper is not affected in most of the soils. As a matter of fact, it will stay alive and will serve longer even in slightly alkaline or acids soils, and it will give much better service than lines made out of steel even if they are galvanized.

One of the foremen, whose crew was most of the time on water lines and fireplugs and thrust blocks, was Paul Mascarenas, who was in the areas I inspected occasionally. He, I believe, was a Greek in addition to our other Greek friend. He seldom needed any close watching, as he knew exactly what to do and how to do it. He and Joe Krmpotic were the most exacting of the foremen, and neither of them hesitated to fire any operator or workman who did not follow their orders exactly. However, they were cooperative with the inspector.

On Friday, September nineteenth, all pipe crews in one general area were being watched by Ace Howard while I was on compaction across and north from the Mount

Rose highway on the big water line to the water tank. I was called to take Ace's place at twelve-forty, because he had been stung a second time by one of those vicious Tahoe yellow jackets and had to go for treatment. His wrist was swollen twice normal size, but he managed to stay with the pipe crews for a while. Actually, the doctor suggested that he better get out of the district because if another yellow jacket would get him up near the throat area, he might not be able to live long enough to get to a doctor. So Ace gave the thing up and left for home. We missed Ace, the rest of us, very much. I had received a sting myself by one of those bees on my ankle a few days before Ace got his, but I was not as affected as badly as he was. In the fall of the year these yellow jackets seem to be more vicious than other seasons.

The following week work was slow on the first day due to excavating equipment running into boulders and heavy rock. At four P.M. on that particular Monday, Joe Krmpotic told me that the trench on Country Club Drive would be filled after fivethirty P.M. Thus, I was on duty 'til work had to be stopped on account of darkness. The following day Bill Wiseman, on loan from Clair Hill company, was to assist with inspection on special pipelines. I took him over to the job explaining what had not been done, and I also went over the plans and specifications with him and introduced him to Leo Tuccori, Joe Krmpotic, and Pete Thomson, also to John Stanley and Merl Sawyer. He went to work on the pipelines on Eagle Drive; I covered water mains on Pete Thomson's crew and checked progress on the pipe jacking operations under the Mount Rose highway. Merl Sawyer was on Unit 3 as an inspector part of the time, but as I remember he went to Units 1 and 2 which had been contracted by Teichert. They had started pipe laying as I remember in late 1969. Our

first snow storm came October fourteenth. Work started this date at the usual time, but snow interfered with operations, and they were cut off at eleven-thirty A.M., but they continued October fifteenth, a cold day with some rain. At the end of this day I went down to the clothing store and managed to buy a rubber suit containing pants, jacket, and hat because I knew we would be working in water and some swampy areas and would also need the protection from rain. Actually that was the only day while I was working at the north end of the Lake that I had to use this rubber uniform [Laughs]

Fine grading had been done on several of the Unit 3 roads where all utility lines were in place and accepted; thus it was possible in October to start laying the cement-treated base, all of which was inspected by John Stanley.

Between October fourteenth and October twenty-seventh, I was busy with backfill and compaction in trenches, and with special drainage problems, construction of manholes and some water lines, and with concrete pours of thrust blocks. By October twenty-seventh, the cement-treated base was ready to receive asphalt paving. Thus the subcontractor, Nevada Paving, started this date with Bob Smith, superintendent; Steve Miarecki, foreman; Tom Smither, paver operator; Jerry Walsh, screed man; two roller operators; one raker; and seven teamsters (that is, truck drivers hauling asphalt mix). Equipment was one Barber Green paver, one Gallon two-wheel steel roller, and one pneumatic roller (that is a Rolapactor), and seven trucks.

Inspectors duties in paving include quite a number of operations. First of all, he must take temperatures of the delivered mix. This was usually done right behind the paver. You must get the scale weights from the delivery truck because in most cases the paving is

paid for by the weights, and he must take occasional samples of the mix for testing. He watches the laying and the raking, checks the thickness after initial breakdown by the steel roller, and he makes visual checks for uniformity of thickness, and [he] watches for push-ups of base material. These push-ups occur right behind the screed where a pebble or a rock may have been on the surface and it causes other dirt to be brought up and gathered ahead of the screed, and [all] of a sudden [it] comes to the top. Those have to be cleaned out, and the inspector and also the raker should watch those. [A] good raker will have his eye on 'em and the inspector will not have to do so much, but they must be watched and taken out and more hot asphalt thrown in before the breakdown roll takes place.

Something which must be done as pavement goes on is what is called *cold mix*. And the edges of that cold mix in one pad usually [has] to be treated with a light asphalt, such as MC-1 or SC-1; that is, the edge has to be treated with [light asphalt] before the next pad is put along beside it. Also at the day's end, it is difficult to chop off the pavement perfectly square, so a rope is put down right near the last pour and laid right across the pavement and it is paved over the rope full thickness and then cut off. The next morning the pavement is broken right by the rope and you get a square edge [at] which to stop. This square edge, being cold, also has to be doped with a little soft asphalt to make a good joint. If not done there will be [a] crack there and also cracks along the joints in the pad if it is not tied in with a light asphalt.

This first day of paving started with the upper end of Bunker Court, then went to Golfer's Pass. Only forty-one truckloads were laid this date. Pay quantities were kept in a fuel book which was delivered periodically to the district office.

Inspection of these paving operations was my responsibility through November fourth at which time I left the job due to [a] previously arranged trip by air to visit relatives and friends in various parts of the U.S.A. During the six days of paving, a considerable amount of Golfer's Pass was finished; Trent, Snead, and Bunker courts were finished and some paving was laid on Wilson Way. Twelve hundred feet of dikes were also laid to protect lower sides of roadway from erosion from snow water and heavy rains. John Stanley took over the paving inspection after I left, but operations had to be suspended after a few days on account of weather conditions and were not resumed until 1970.

Early in November, Mrs. Little and I boarded a plane and took our vacation. It was already very well worked out by the travel agency. I believe altogether we were on six different airlines and we had seven to nine stopovers. The stopovers weren't always at places where we had people to visit, but simply to change planes or wait for a while.

Our first ride was from Reno to Denver, where we changed planes, to Omaha and visited Elaine and Bill Steinbeck. Elaine, when she lived in Carson City as a teacher, was Elaine Moore, and she and her roommate Jan practically used Mr. and Mrs. Little as their Nevada parents. They were both from the South, and when they first arrived, they soon were broke. Well, Mrs. Little staked them, and from then on we were in. Elaine went on to Germany where she taught for several years and married an officer there, and at this time she was living in Omaha and already had two children. So we spent a nice day or two with Elaine and her family.

We went from Omaha to Joplin, Missouri where my sister Helen met us. She lived just across the Missouri line there in Kansas and we spent, I believe, three days with her, after

which we flew to Florence; Alabama where our daughter Elaine met us and took us down to Haleyville, where Elaine and Jim and a family of three boys and a girl lived. We had a nice visit there; however, a big hurricane came up which did considerable damage south of us. We surely felt it up there in that part of Alabama, but it was not nearly as severe as it was to the south.

During this time Elaine took us down to the University of Alabama at Tuscaloosa, where we visited my cousin Alta and her husband; both have their Ph.D.'s and he is head of one of the departments at The University. Although she [Alta] has her Ph.D., she's no longer teaching. So we spent a time with Alta, the daughter of my aunt Julia, and we went back after a full day spent in Tuscaloosa to Elaine's house. Now we spent about ten days there altogether, and I spent most of my time raking leaves. They had a big place with about an acre and a half and I think there were two hundred trees on it, but I got my exercise anyway.

We left after about ten days to fly to Texas to visit an old friend of the family. On that trip we had to go to New Orleans first and change planes to Houston, which we did; and from Houston we got on another plane to Amarillo, Texas, but unfortunately a storm came up and we could not land at Amarillo, so we had to go back down to Midland, Texas and take a bus, and we rode into Amarillo on a bus. We spent two or three days with Cora and Ralph Collinson, [at] which time they took us around the countryside. Ralph was a cattle buyer and we toured several of the cattle feed lots. I have never seen a feed lot with thirty thousand cattle in it before, but there were several with that many. These cattle are fed under a certain system. When they're brought in to go in to the feed lot, they are placed on a feed which [is] simply something like

alfalfa hay with just a little extra nutriment added to it. Then, as time goes on, that feed is fortified with other nutrients to produce rapid growth and fattening. Sometimes they will get sick and there is always a bunch of cowboys around to herd those sick animals out and put them aside somewhere until they recover. It was quite an operation; I was used to handling cattle as a young fellow, but we didn't bother with the feed lots. They had grass and hay and that was it. The beef we had didn't have a lot of fat on it, but it had good meat. We left Amarillo and came again to Denver where we got on United Airlines again and flew back to Reno. This altogether was a very enjoyable trip.

Early in November was the last time I was assigned to Unit 3. John Stanley and some of the other inspectors were to come back in 1970 and finish it. Most of the finishing, though, had to do with paving, and I believe John handled all of that although there were some missing links with which I helped him later on.

There was also a small unit just above, just across [the] Mount Rose highway from Unit 3 called 1-A. Byars had that contract and the pipelines had been laid in that in 1969, and John Stanley had the cement-treated base and the paving and the fine grading course to watch on that area.

I think I should tell a little something about these various units on which I worked in the three years I was in the Incline district. [Unit] 1-A was a small one of Byars and it was located west of Unit 3 just across the highway, and there were approximately seventy-five lots in this area. I tried to get exact figures by counting, but the map I had, the printing was so microscopic I could not get a fair count. And there was 1-B which was a Mandeville contract which was about the highest of all of

then and that adjoined Unit 1. [Unit] 1-B was rather a short area and it was just west of Unit 1 in the high country. I believe there were only twenty lots or thereabout, in Unit B.

Unit 1 was a much larger unit. Unit 2 was the largest of all. Both Units 1 and 2 were under contract to Teichert. Unit 1 was west and north of the Mount Rose highway between Units 2 on the southeast and 1-A on the northeast. Unit 2 was a snaky, long unit and it had a lot of subdivisions. I believe there were twenty-seven sections in it. They used up the alphabet through Z and had to put an extra one on "double Z" [ZZ] to get a notation. Unit 1 had approximately 225 lots, and Unit 3 I managed to [get] an exact count [on] that because I had a blownup map. There were 503 lots in Unit 3—that was the largest in the district. Unit 4 by Shea, a contractor from Redwood was northwest of Mount Rose highway with a portion of it just east of the Second Creek canyon, and that unit had about 300 lots.

Unit 5, the last one built, was by Highland Construction. It contained about 260 lots, and it was north of Ponderosa and Woodridge subdivisions. Unit 5, however, was not started until later, I believe 1971. Inspection on 1-A was handled by Dave Pond and Merle Sawyer on the water and sewer lines and by John Stanley on the CTB and plant mix surfaces [as] I stated before. [Unit] 1-B was inspected by Givens on the pipelines and on the grading, and by me on the paving. Teichert jobs, Unit 1 and 2, were inspected by Givens, Dave Pond, and I'm sure also by Merle Sawyer; and of course, I had a lot to do on both Units 1 and 2. Unit 4, the Shea job, was inspected by Leonard Jensen and by me. Most of the pipelines were in on Unit 4 before I took over in 1971. Unit 5 was inspected by Vic Clyde with some of the paving inspected by me. These construction projects were under way in 1969 and 1971,

principally, except Unit 5 which of course was all done in '71 as I remember.

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In 1970, I got the usual spring gardening started and planned to handle [it] in such a way that my inspection wouldn't bother too much. So I didn't branch out too much with flowers and vegetables, although I did have a pretty good garden.

I was informed by Erik Beyer to appear at his office May 11, 1970, and I went with Erik over Unit 4 (69-6 was the project number this date and was assigned to check initial laying of pipelines. Not much work was done the first day, but the foreman Ken Doelker started cutting pavement in an old access road so that the sewer trench could be dug in order to accommodate the main coming from Unit 4. On May twelfth one pipe layer, Nick Nemath, and a blade man and a shovel operator and one laborer managed to lay eighty-four and a half feet of six-inch Certainteed fluid-type, Type One transite sewer main between two manholes. Progress was very slow.

On the following morning, after spending only two days and forty minutes on this project, I was contacted by Erik Beyer who transferred me to the Teichert job, Project 68-3 on Unit 2 section where I was to watch grade, cleanup, check compaction, and inspect base construction and surface paving. This also was to continue on Unit 1. The inspectors on Unit 4, the unit which I left, I believe there were two assigned that, as I have said before, but I don't remember now just who the second man was. As a matter of fact, I did a considerable amount of pipeline and sewer service inspection on Units 2 and 1 in addition to areas to which I was assigned, since the Teichert company had two projects under contract the same time they had at least two

crews, sometimes three, and sometimes four each with a foreman. At the time I began work on Unit 5 the superintendent was James C. Gadley. Foremen at the time were Clede Smith (part of his time was spent on Unit 1); Swede Bell, on services; Gary Reid, on grade and on utility mains; Don Collins, formerly with Isbell Construction Company was also a top foreman and assistant to the superintendent. Grade setters of sewer pipe mains—there were two of those, but I don't remember the names of them. One man's last name was Lambert, and the other one left at an early time so I never did get to know his name. Dino Smernis and Martin Summerville were grade setters on fine grading of roadways. There were quite a number of equipment operators and laborers. Inspectors on these projects besides myself were Dave Pond, whose mode of transportation was a motorcycle, and Merle Sawyer, who used a somewhat battered red Volkswagen for his transportation.

One of the technicians, an employee of a testing agency, was Rich Glass, who was on the job quite a lot of the time, checking compaction results and taking samples to deliver to his headquarters. These samples, delivered to headquarters were for gradation or other tests such as asphaltic mix. Richard, by the way, is the older son of Mr. and Mrs. Al Glass of Reno, and his mother, Mary Ellen, is head of the Oral History department at the University of Nevada. She is the very fine lady who convinced me that I should do what might be called an autobiography for the sake of future researchers in history of Nevada. Little did she realize that it would be a lot easier to get me to start than to finish what has seemingly become sort of unending dissertation.

Earl Keebles was another technician taking samples. My first work on Unit 2 was to check to see that all water and sewer services on lower Tyner Way to its

intersection with Gale were either finished or that proper references [were] marked. I found several services unfinished and one manhole completely missing. I assisted one of the grade setters occasionally for a few days in setting grade for roadbed and setting centerline stakes.

All of the mountain terrain contained potential trouble in construction. A good portion of it had to do with drainage of wet spots not shown on the plans and a good part of my time was spent on these items—seeing that drain pipes were put in their locations at the proper depth and that rock backfill and perforated metal pipe underdrains were placed, and covered, of course, and properly compacted. Extra work orders and extra expense were the result. Where all pipelines had been laid in certain sections fine grading was under way. Some of the finer soils which were not sufficiently wet had to have water added to get proper compaction before placing the decomposed base. A wetting agent called "Earth Pack" was again used to aid in water penetration of the finer soils. The finegrain soils, of course, do not give much trouble in the wetting and the blades have very little trouble with those, but they have to drift the fine soil windrows back and forth quite a few times in order to get proper moisture distribution before spreading and compacting.

Telephone cables and power cables presumably laid in wet areas were cut in several places during excavating special drainage trenches which had to cross these underground lines. The telephone and power crews made repairs.

In doing the fine grading after all lines were in, care also had to be used to avoid disturbing such items as utility boxes and the water valves and other items along the roadway. Most of the roadways contained

three parallel trenches: a sewer trench, which contained only the sewer line; water and gas trenches, which contained both lines; and power and phone lines in one trench. And in addition, of course, there were numerous lateral services, cross trenches, leading to the lots and to the fireplugs.

The subdivision populations take for granted these multiservice lines and paved roads, but little do they realize the careful planning and the closely checked conditions required by engineers and contractors' crews in providing them with these modern conveniences. Most of my time during the later part of the month of May included checking fine grading and repair at wet places, cleanup [of] the boulders and debris, checking compaction, and taking measurements of pay quantities which other inspectors were too busy to record. One day was spent watching paving on Camel Street just above the college. This area was outside Unit 2, but heavy equipment had damaged the original paving so that new paving had to be placed. We could have used at least one more inspector on these Teichert projects. Operations were going on in as many as half a dozen places, sometimes at the same time.

I devoted a considerable amount of time in checking manhole construction and construction of laterals, but had to drive back and forth from one work area to another all day long. One special trouble area on Tyner Way was a wet place through which black plastic pipe had been laid by the power and telephone companies in 1969 without first draining the area. Winter freezing of the water, which had gotten into the four-inch plastic pipe laid to carry the telephone cable, caused the pipes to heave so badly that the telephone wires were broken in several places. Power conduits, deeper in the trench were not affected. Correcting the problem

involved placement of proper drains by extra work order, removing a number of pipes and replacing them. The wiring was then pulled through the pipes, the trenches again backfilled and compacted.

Grade setting operations were slowed for a few days due to employment of a green blade man. Grade setters objected to his operations, and Foreman Clede Smith finally removed him.

During the last part of May the working hours were increased to the point where I had to be on the job by six-fifteen A.M. The long work period was needed to raise the grade as much as one foot over wet areas after rock and perforated metal pipe drains were in place.

By June second the entire thirteen hundred feet of telephone conduit repair had been finished on Tyner Way, and the trench was backfilled with suitable free draining material and compacted. Fine finishing of a grade was then completed in the area, and adjoining areas were all ready for base course. Early in June, I inspected a number of water service installations, including proper placement of boxes at property lines. These included services in Block N, Block I, Block O, and later in Blocks M, J, and K. Some of the services were double and some were single.

During the period, I discovered trucks unloading material into the stockpile. Upon inquiry I found they were Mandeville trucks hauling what they called "base course." The material, however, was unsuitable for base because of the large rocks and boulders. Mandeville apparently had agreed to furnish base course for Teichert. I contacted Teichert's foreman, and neither he or anyone else in Teichert's organization had knowledge that this operation had begun. I rejected the entire stockpile as base course. It was allowed for use, however, for fill where wet soil had been removed from subgrade. There, seemed

to be a lack of effective communication on this project in several areas. More base of similar nature but without so much oversize was spread on the roadway, but large rock was bladed off and hand-picked. All base for the Teichert contract was to be made of decomposed granite, but was to be free of large stones. Considerable testing and retesting of compaction in trenches and then roadway subgrade and base was done this month by Earl Keebles, Richard Glass, and another technician from Harding, Miller, and Lawson and Associates. There was a shake-up in Teichert's organization on Units 2 and 1 about that time. Athel Smith was sent to the job to replace the former superintendent, and two of the foremen were replaced. Teichert's local headquarters and equipment storage area was just west of the Mount Rose highway at the intersection with Barber Street, which was also approximately at the division line between Units 2 and 1. This shake-up in the command seemed to aid considerably in correlation and efficiency of the work.

Vince Ethlestrom, called "Swede," was placed as foreman in charge of placement of water services, and during the month of June, I was inspecting placement of water services to at least a hundred and fifty lots, and placement of about twenty fireplugs. Sewer lines including manholes, water mains, gas and power and telephone lines were already in place; thus fine grading and base course followed closely behind the water service operations. I did the inspection on all these operations and it kept me jumping. Testers had established a trailer or camper on this site so that compaction and some sieve analysis could be done on the job, thus keeping current with test results so that it was not necessary to take the time required to send them to the laboratory and get the results back.

Don Collins was kept on, of course, as one of the chief inspectors. Don had known me when we were working with Isbell, and he had the habit of getting something started and telling the boys he was going to leave now, but Prof was there—"he'll take care of everything." I was not supposed to take care of everything, but he left me with it, so what else could I do? This may have been a compliment, but I managed very well.

Work as described for late June continued on into July. I spent Fourth of July in Reno doing a band concert at Idlewild and also played for the fireworks at the University stadium. I spent Wednesday evenings at band practice and Friday evenings at the regular Reno concerts which usually took place at Virginia Lake, but sometimes they had it at some other city park area. This took quite a little time. Watering and caring for lawns and gardenings in the evenings and weekends were included in my activities. I really kept busy during my retirement.

Subgrade samples taken by Rich Glass, July second, for relative compaction were all okay, getting values between ninety-two and ninety-eight percent. Watering the grade and using the sheep's foot rollers more thoroughly was now proceeding much better than it had earlier. Eight base course compaction samples taken July eighth showed excellent results, but the variation was only ninety-five to ninety-eight, ninety-five being the minimum. Our values, discovered some years ago by highway researchers, sand equivalent tests, and Atterberg limits were all passable on the decomposed base on lower Tyner. Paving with 85-100 penetration grade asphalt began July twelfth, but a prime coat of twenty-five-hundredths of a gallon per square yard of MC-70 was spread July first over the base course.

Athel Smith, superintendent, and Foreman Don Bruner, and Eddie Clay

observed the start of the paving. Bob Lynch ran the Cedar Rapids paver and was assisted by Angie Aja, street man. And there was one screen operator, one raker, and two laborers present. One Hyster roller, a two-wheeler, and eleven trucks were used in paving. The hot plant was located in Truckee. A hundred and fourteen point seven [114.7] tons of asphalt paving was laid this date. Aggregate for paving the three quarter-inch maximum size conforming to the Nevada state Highway specifications and about six and a half percent asphalt was used. Fourteen temperatures were taken from the freshly laid pads between eight-thirty and three-forty-five P.M. and gave values from 245° and 275° which is very good. Average thickness of unfinished pavement was specified at two and a half inches. Measurements taken of the first two days' run showed values of two and a half to two and seven-eighths inches. Cold joints were properly primed in the morning with MC-70 before placing a new pad.

The third day of paving consisted of pouring dikes on the lower edge of paving to carry surface water to paved outlets, in fill slopes. For safety, I requested a hundred and fifty feet of guardrail be placed on the outside of one curve where the radius on Tyner Way was small and the road was narrow, and the curve, of course, was very sharp. This guardrail was put in late in the fall.

After three days of paving, my inspection work was resumed on fine finishing of subgrade, placing more water service valves and fire hydrants. Other inspectors were busy on the upper areas of Unit 2 and in parts of Unit 1, where water and sewer mains were being laid. During the four days in July, the crews I had been watching were broken up and sent to pipe laying and cleanup areas. I spent only a few hours on a job each of these days. In early August several changes had

to be made in grade on Marlene Court and Shirley Court at the highest points on Unit 2. Wet places also were excavated and backfilled and the grade bladed and recompact. Rich Glass made about fifteen compaction tests, and retests where necessary in this area until density and grade were acceptable at all points.

Savage Construction of Carson City commenced hauling decomposed granite for base course. I believe they replaced the operations which were previously done by Mandeville, but this operation was temporarily slowed down due to shortage of trucks. August tenth and eleventh were spent measuring road widths and widths of parking bays on Tyner from Station 83 + 50 to Station 129 + 00 and widths of narrow streets leading to several courts, a total of forty-eight measurements.

John Stanley needed my help for a couple of days, so I spent part-time on Unit 3 with a two-man crew equipped with a "doodlebug" to detect the location of unmarked water services. I also observed a two-man crew on Unit 2 making leak tests on sewer mains under four pounds of pressure per square inch. All passed..

Some services on Little Burro Court on John Stanley's job were missing. I gave John the location notes and he arranged to have the services placed. I met Richard Glass August thirteenth on Tyner Drive and received his compaction values obtained on Dorsey in the "mud" section of Unit 2 and on portions of Tyner. All fourteen values were from ninety to a hundred percent and all okay as subgrade samples.

August fourteenth was an extremely busy day for me. I was covering some work on services on Unit 3, but had to leave that project early to measure asphalt dikes placed on Gale and Tyner, Unit 2, and thirty-eight-inch subgrade widths on Valerie, Nadine and

on a portion of Tyner. August seventeenth I had to leave the inspection job in order to meet and confer with my contractor on assessment work on the Nevada Diamond perlite claim, eleven miles east of Sparks.

The next seven working days were used to haul, place, and blade base course obtained from stockpile near the Ponderosa Ranch. Two grade setters were kept busy checking grade on base, and I checked depths. Athel Smith, superintendent, wanted to omit the asphalt prime and get by if permitted to do so by simply watering and rolling again before paving. I did not believe this would be satisfactory, but I was overruled by Erik Beyer, who okayed omitting the prime, providing extra good compaction could be obtained. Of course, my experience is there; I do not blame Erik—he had not had too much experience with paving, but he was the boss so I let it go. These were low traffic roads anyway.

Paving was to start August twenty-sixth; thus there was a rush put on base construction, but some inequalities had to be ironed out in certain areas. Also Richard Glass was put under the gun to hurry his compaction tests. I made numerous depth checks and found some variations which are expected, but the average depth was well within the specifications. Apparently adequate watering and compacting with a Ray Go vibratory roller did a good job on the base course because compaction tests, by Rich Glass, give values averaging a percentage point or two above the ninety-five percent of optimum which was specified.

The contractor's crewmen on this rush base job was headed by Don Bruner as foreman, with two grade setters, two to three equipment operators, two roller men, two water truck drivers, and eight to twelve gravel trucks furnished with a driver by a subcontractor.

All sewer and water lines and services were rechecked for leaks and obstructions before paving could begin. After all base and other items were ready, paving thus could be completed on all of Tyner from Dorothy Court to the upper end of Tyner, all of Garen Street, Marlene Street and all courts which adjoined these streets. The paving crew, overseen by Ed Strike, foreman, consisted of pavement operator, screed man, raker, and three laborers. Equipment included the Cedar Rapids paver, a Hyster two-wheel steel roller, and a nine-wheel rubber-tired roller for final rolling. The final rolling is much better done by one of these multitired rubber-tired rollers. All those tires are put on one single axle, and there is weight put on them by heavy weights riding over the top of the wheels. Asphaltic mix was hauled from the Teichert hot plant at Truckee, using ten transfer trucks and four trucks with "pups" [laughs]. "Pups" are the small trailers also loaded with asphalt behind these trucks.

In addition to observing paving operations, the inspector must take frequent temperatures of the fresh mix just behind the paver before breakdown rolling and must collect all trucks' scale weights as usual. I was responsible for inspection of all base course and paving on the Teichert contract, which included both Units 2 and 1. Whenever I had a chance to do so, I also had to occasionally check base course work and some fine finishing of subgrade on other areas. Some days the work started at six A.M. and continued 'til six P.M.

Three-page daily diaries were required for several operations when progress [ing] at the same time. Diaries were written in evenings at home from records kept in these little pocket notebooks. I could have used some help, but John Stanley, the only other professional-grade engineer who was qualified for paving inspector, was busy with his own work on

Byars' contracts on Unit 3 and 1-A. Stanley spent some long hours on the Byars jobs. He had one advantage on me. He rented a small cabin in Kings Beach and drove to his home in Carson only on weekends. Of course, he then had only a mile or two to drive to work, where I had twenty-five to thirty miles depending where the work area was located.

Paving, base and subgrade operations, as I have described them for August twenty-sixth, continued without serious interruption until the Labor Day weekend, September fifth to seventh. As was the usual custom each Labor Day, the Reno Municipal Band played during the celebration at Fallon, and I was there with my French horn. I attended Wednesday night practices and Friday night concerts in Reno also during the summer season in 1969 through 1971 while I was inspecting Incline. This required considerable effort but I managed to do it.

Senator Alan Bible seldom missed being at Fallon for the Labor Day celebration. He always managed to get near the Reno band so he could give me some friendly jibes about tooting the horn. Alan was a charter member of the Carson Rotary Club and had been a member of the state Highway board of directors when he was attorney general. I had known Alan very well.

Andy Drumm and Carl Dodge, long time contractors, were always there, Andy with a special rig for the parade. Andy also managed about parade time to find me and give me some jibes as an ex-Highway man gone wrong with a brass horn.

When it was time to leave the celebration, Mrs. Little and I always stopped at the melon stand and purchased some of those unbeatable Fallon Hearts O' Gold cantaloupes, which can be grown better in Fallon, Nevada apparently than anywhere else in the United States. And we picked up a couple of Crenshaw melons—

something new for that area, but they found an early one which would mature in that district.

Back on the job again at seven A.M., September eighth; both paving and base operations going on at the same time. John Stanley was not busy at the time, so he was able to spend a few days with me on the base course while he was waiting for Byars to make some adjustments on Unit 3 and 1-A. I needed the help. There was too much to watch carefully on base course, as well as on paving. I stayed on the paving, and John took over on the base and had Richard Glass take a number of density tests where none had been previously taken. John Stanley suggested I take his notes for my daily diary so there would be no confusion as to which project he was working. This I did.

September tenth, the Cedar Rapids paver broke down after laying a few loads on Valmy. The break was so bad that it apparently could not be repaired on the job site. In the meantime, all the paving trucks were lined up waiting to unload. There were thirteen of them, ten transfers and three with "pups." I had the foreman, Ed Strike, call Superintendent Athel Smith, on his intercom, and Athel could not get another paver on the job until the next day. There we were with about twelve hundred dollars worth of paving on these trucks and it would be useless to allow them to cool, because it would have to be thrown away, and I suggested a way to use the mix and the contractor's men were happy to try it.

The trucks were allowed to dump their loads almost pad width, one by one, using the chains on the end gate to control the outflow, until they were all unloaded. The temperatures of the mixtures fortunately were still 225° Fahrenheit or better, and [Skinner], the top blade man of Teichert's was obtained.

He then bladed this loosely spread mix as fast as he could to an approximate thickness of two inches. This was broken down by the two-wheel steel roller, then compacted more by the nine-wheel, rubber-tire roller, to produce a thickness of approximately an inch and a half. There were lots of variations in this thickness.

The next day the substitute Cedar Rapids paver was put on and carefully adjusted by the screed man while it was moving with fresh hot mix, so that a thickness of about one to one and a half inches could be added. This was very hard to control, but the finished paving didn't look too bad. Its thickness varied from about two and a quarter to three and three quarters inches, sometimes a few more inches than that. However, there could not help but be quite a little variation; nevertheless, it was good enough to be acceptable in this lowtraffic road and court which served only twenty-three lots.

A light seal coat was given the paved area in late August and early September using dilute emulsified asphalt. This seal was quite a little heavier than a strong fog seal. It probably [was] about a tenth of a gallon per square yard. It was recommended, of course, for protection of the paving through the first winter.

Dave Pond and Merle Sawyer were with the pipeline crews and I did not see much of them, as I was a considerable distance behind them on base courses and paving, but I did have to look into unforeseen drainage problems-on both Units 2 and 1 and recommend treatment. John Stanley had to be on Unit 2 at times, and then go back to the Byars jobs. I was lucky that John was up there. Swede Bell ran the patching crew, Ed Strike was still running the paving, and Don Bruner the base; thus there were now temporarily at least three crews for me to watch.

Pavement patching in low places and around concrete boxes was aided by using a

fine graded mix, that is, a mix with maximum size aggregate about three-eighths inches. Dike construction, previously done, also had to be patched where it was damaged by equipment. A mechanical broom and some hand brooms had to be used to clear pine needles and dust from areas to be patched.

Because there were so many compaction tests required on trenches as well as on the subgrade and base, Harding, Miller, and Lawson had a camper installed so that some of the testers covering compaction only, could stay on the job rather than commuting to Reno back and forth every day. There were two testing technicians besides Richard Glass; these fellows stayed in the camper. I don't recall their names. They did testing for me later in the fall a few times, but Richard Glass stayed with me most of the time on the base course and on the subgrade.

More parking bays and dikes were built on, or adjacent to, the freshly laid paving during the middle of September. Quite a little handwork was required for these operations. Bill Bounds operated the dike-laying machine.

There was considerably more going on than I could carefully inspect. I got some help from Athel Smith himself, the job superintendent. Athel watched the dike construction and some of the seal coating, so I could devote more time to base and paving. Athel was a fine engineer, in addition to being superintendent of the job. He was always insistent upon getting the work done in a satisfactory manner. He appreciated my help on the job as much as I appreciated his help. We both were looking for the same ends—the best possible workmanship under the conditions.

Some of the base courses on steep hills had to be compacted by running loaded trucks over and over it because it was too steep for rollers. This happened many times

on especially steep roads, particularly the ones which led to very infrequently traveled roads on the water lines and up to the water tanks.

We started base course on Unit 1 during the middle of September. Portions of Barbara and Jennifer streets on this unit were ready for paving by September eighteenth. Jill and Dee courts on lower Tyner, Unit 2, had not received base course until the middle of September. This was done rather hurriedly so that the two courts could be paved September twenty-first. Depth checks on Jill were taken at thirteen different points and considerable variation found. After making some corrections and recompacting, Richard Glass and his assistant found compaction five percent low in the middle of the court, but the others were okay. A little more water was applied and more rolling, but was okayed by me without waiting for another test, as it was too late in the day and the testers were busy elsewhere. Compaction appeared very good or I would not have approved. Experience, of course, on similar situations gave me pretty fair knowledge in that respect. Both Jill and Dee courts were paved along with some other unfinished paving in areas on Tyner, September twenty-first.

On the following several days, base course was finished and ready for measuring and testing on Jennifer and Geraldine Streets. This, of course, was in Unit 1. Richard Glass's density tests were okay except in certain places which had been reworked. In this same period, the dikes were just about finished on all of Unit 2 except on a few of the curves with short radii. Such areas called for considerable hand compaction and shaping of the dike by shovel padding. The machine would not go around these curves with short radii without making a mess of it. The dike mix was made about at three quarters of a percent fatter in asphalt than the regular paving mix.

Some special equipment had to be used, as I have stated before, on steep hills. There was one leading to the pump house off Tyner which was a good example of this. It was necessary to hook a special loader equipped with rubber tires to the asphalt trucks to help them get uphill. The steel twowheel roller could not be used on account of the grade. An accident happened with a steel-wheel roller. The man on the roller managed to get it part way up the hill; then he lost control and began to slide backwards, and these two-wheel steel rollers certainly are not as easy to steer as an automobile. So it rolled on down across Tyner at which time he luckily jumped off and the steel roller ended up down near the bottom grade and it took quite a little doing to get equipment down there and get it back up. The rolling, of course, in order to compact the material then had to be done with that big wide rubber-tired roller, but it too had to be pulled by a loader or some other instrument.

Most of the time after the middle of September was devoted to base and to paving and to dike construction; the crews were on both projects, Unit 1 and Unit 2. Unit 2 was nearly completed except [for] the cleanup and some patching and seal coat, and the raising of manholes and cleanouts on sewer lines, and raising water valves and power and electric boxes. These had to be raised to conform with the finished asphalt paving. This latter type of work is somewhat tedious, and care must be used to bring all such openings placed in the pavement up to the pavement level or just barely below it. If it is above the pavement, just a little bit too far, there is always danger that it will be clobbered someday by snow-removing equipment.

The special hot loads of asphalt mix are kept on hand on the job when this paving and trimming is done around these manholes and other things like valves and boxes. This

mix contains a small maximum size, and all compacting must be done with hand tampers; those are not particularly easy things to operate, but it takes some labor specialists with experience. Checking all of these places, of course, is another chore for the inspector; however, later on most of that was done by other people.

In snow country you're always confronted with the problem of getting the snow off these roads and doing it in such a way that traffic will get over and that you've not disturbed any with these miscellaneous structures. You must remember, of course, that there are not only metal things sticking up out of the road, but over on the side there are some concrete boxes where the power and telephone lines are placed.

John Stanley had some extra time September fourth, and he checked fine finishing of grade on several cul-de-sacs and parts of some streets in the upper areas of Unit 1, while I was checking paving of parking bays and laying of dikes. John asked me to record his notes on my report which I did. More detailed description of these activities can be obtained from copies of some diaries which I have selected at random and submit[ted] for University files where they can be observed if necessary.* John also checked base being placed on Geraldine Drive from Jennifer to Ellen Court. He said the Indian fellow setting grade was doing an excellent job.

At this time of year, weather is getting cool with frosty nights, and quaking aspen in the high country are taking on their yellow and orange hues. Contrast of color in the hills— green shades of pine, fir, and incense cedar, blended with colorful quakers, observed against the clear blue of Tahoe below with a canopy of blue sky above feathered with a few drifting white clouds—all these resulted in a fantastically colorful show

which cannot be painted just with words. Another phenomenon of nature which I was privileged to observe a couple of times is the breeze-borne, pollen show. The ideal position from which to watch it is at higher elevations looking down against the blue background of the Lake, especially on a fairly calm day. These whispering, moving streaks of yellow pollen produced by just what species I'm not sure drift downward in the crossed masses of trees, accomplishing what nature intended— continuity of the species. When the breeze is just right, quantities of this pollen is deposited in the Lake. These pollen deposits float and are drifted by wave action shoreward resulting for a few days in an unbeautiful shoreline.

The last four days of September were spent placing base course on Unit 1, Project 68-2, on the pump house road, on Jennifer Street, and on five courts; also, fine finishing of subgrade was done on the upper reaches of Unit 1. These crews were under Don Bruner, and Ed Strike was in charge of the paving crew on the lower pump house approach road, Unit 2, Project 68-3, and on Hazel and Colleen courts and on Geraldine Street from Jeffrey to Randall Avenue on Unit 1. Clede Smith was in charge of backfill crew (that is, placing backfill behind dikes and cut sections), and Swede Bell had charge of the dike construction. Subgrade and base course compaction tests on Unit 1 were taken by Rich Glass and were all satisfactory. Equipment used in these operations included just about every kind available, and crews besides foremen included as many as five equipment operators, sixteen truck drivers, four paving and dike specialists, and fifteen laborers, besides the paver operator, screed man, and raker. Of course, these crews were not all in

*See Little papers, UNR Library

one place but were scattered all over these two jobs with as many as two to three inspectors.

The first part of October was as busy a time as any other. They were [in] too much of a hurry in some of the paving operations, especially in Jeffrey Court. That was done while I was in other areas and when I went back over it, I found quite a lot of repaving to do. The finished paving showed a “bird bath” about four inches deep when measured with respect to the surrounding paving. A three-eighths-inch maximum size mix was secured and the “bird bath” was filled and feathered at the edges. I had the water truck wet it down to check drainage.

Erik Beyer, district engineer, was on the job for a while, October second, and called attention to the erosion barrier required. The trench for the barrier was excavated but paving would not be put in until Monday, October fifth. The base crew was to work Saturday, the third, so that paving could be placed on Harper, Judith, and some of the other courts in the upper part of Unit 1.

Richard Glass and I were present Saturday to take compaction tests and base depth measurements. A hassle developed Saturday afternoon between Mandeville and the Teichert people over priority with respect to use of paving equipment. Both contractors planned to pave Monday morning. Mandeville’s only access to his area was through Teichert’s operations on Randall and Harper streets. Mandeville wanted priority on the paver, as the paving subcontractor would be moving out of the area to another job October seventh. Teichert’s people were quite determined to use the paver on their job Monday and Tuesday regardless of what happened to Mandeville and Unit 1-A [laughs]. I tried my best to get hold of Erik Beyer, the district engineer, because this should be his dish

of fruit. I did not succeed in finding Erik. I did not know Mandeville, but I did talk to Athel Smith and suggested that some kind of an amicable solution was absolutely necessary. Knowing Athel as a reasonable man, I believed that he would come through with a solution, as he would realize that both these jobs should be paved while weather would permit. Nevada Paving had to go to another job which was to last two months and couldn’t get back ’til December, which would be too late, of course. Now the owner’s chief concern, of course, is obtaining a thoroughly acceptable finished product, and that means doing the work when the weather is right to do it.

In the meantime, Rich Glass had come to the job site early and had finished taking the remaining subgrade compaction samples which were necessary on Harper and Judith courts and Randall. All tests were excellent—ninety-six to a hundred percent. Compaction with water contents were all near or at optimum from 7.2 to 10.1 percent. Base course followed on these areas and was completed except for a part of Randall. Rich got compaction answers of a hundred percent on all base course on Randall and Jeffrey with water contents at optimum. He got results of ninety-six to ninety-nine percent on Fay, Judith and Jennifer, with slightly lesser water contents. These particular areas were all ready for pavement except for about a hundred feet of Randall.

My own measurements of base widths and depths on this date showed acceptable construction after making some minor adjustments in depth. This was a long Saturday working day. As I recall, although my notes do not so indicate, I managed to contact Erik Beyer by phone early Sunday morning so that he could be informed of the Mandeville-Teichert hassle.

I arrived on the job Monday, October fifth, at six-thirty A.M. and found Bob Smith, foreman of the Nevada Paving, getting ready to pave on Unit 1-B, the Mandeville job. He and Athel Smith had met Sunday, and as I predicted, Athel had conceded to allow Nevada Paving to go to the 1-B unit with access through the upper part of the Teichert job. Athel would secure the Teichert's paving outfit from Truckee and would pave Harper Court and part of its approach road, all of which could be done and still allow access for traffic to Mandeville's job. These two paving jobs would thus be coordinated without interfering with one another.

Erik Beyer arrived on the job shortly after I did and discussed the agreed-upon procedure. Since both paving jobs were to be hurried, and John Stanley was not available to help me, Erik decided to watch the Mandeville project himself. Erik admitted that the paving operations were somewhat new to him because he had never had much real opportunity to become familiar with them. Therefore, I stayed with him during the time the first few loads were arriving and pointed out potential problems; however, the Nevada Paving crew were experienced and were good operators, so very few problems were anticipated.

The first load from the Teichert plant at Truckee arrived at eight-o-five A.M. and was placed on Ida Court, and approach road, which was not quite finished on Friday. In the meantime, base on Randall Court, and approach road, was receiving the finishing touches getting ready for the paving. I took fifteen measurements of depth of the base and found it two to three inches short for about 105 feet. Don Bruner, base crew foreman, had five additional truck loads of decomposed granite placed and bladed over the 105 feet, which, after watering and rolling, was found

to be sufficient. Rich Glass's compaction tests also passed. These base operations continued at lower elevations all day and I had to decide which way I was going to divide my time—spend more of it with the paving or with the base.

My temperature readings of the paving were very few due to breaking my thermometer that day, but by observation, all loads appeared to be okay and they were sufficiently hot to pave and roll very readily. Rich got good compaction results on base on the afternoon lay-down. Pay quantity details were shown in the diary report Number One Hundred for this date.

Often during construction, it is necessary to make a repeat examination of a certain section of a project to look for flaws which were not detected during the time work was done or to look for trouble which develops subsequently. This is referred to as a "chalk walk." A bad spot and some other unfinished construction details were found during a chalk walk earlier in the previous week. The term *chalk walk* is used to describe an inspection walk by the inspector with plans in hand, sometimes accompanied by one of the contractor's men. It goes over a few hundred yards of partially completed work where bad spots are marked with *keel*, so they will be readily found. Keel is a large colored crayon about four inches long and finger sized. The name I believe comes from a Scotch term, which refers to a red- or ochre-colored crayon of this type. The keel we use is in several colors, black being used sometimes by surveyors marking their stakes, and the red or yellow is used to mark bad spots on pavement or structures. The marks are waterproof and will last for a considerable time.

Now this "chalk walk" is not to be confused with the "punch list." *Punch list* is the term referred to at the end of a construction

job where the engineer, accompanied by the division engineer or some other person who is working for the owner, goes over the entire job and makes out a final list of all the little and big things which have to be done. I don't know [where] the name *punch list* came from, unless it has to do with a list in which there are certain places along side each item that you punch out as each is taken care of.

February 1976, in referring to notes I had made on this particular chalk walk just referred to, I came across a caption printed in large letters in French. It referred to a bad place in the pavement on Jeffrey (I must have done this for the sake of extra emphasis); it read, *mauvais pavé, beaucoup humidité*, "bad pavement, excessive moisture." Base and subgrade had appeared dry in the warm September and were paved over; however, a spring area on the hillside above was a potential water hazard but had gone unnoticed.

Asphaltic concrete pavement is quite impervious to moisture and will seal over an underground moisture source so that evaporation cannot take place. Increase in the moisture subsurface softens the soil, making an unsuitable place in the base and pavement, unstable. These places have to be dug out, drain rock added, and perforated metal underdrains placed to lead the water away from the roadway. Many such places are encountered in mountainous areas but are not always discernible in preliminary investigations [and] thus do not show on the plans. These problems could be reduced by employment of a professional geologist assigned to the preliminary survey and estimate crew. Use of a geologist was begun by the Highway Department about seven years before I retired. The geologist worked out of my department in the materials section. These notes by the geologist are included in

the other preliminary survey and estimate information and furnished [to] the designers so that corrective measures are shown on the plans.

I have covered the events in the early part of October in quite some detail to show these hassles can occur and what can be done to get the ball rolling again as smoothly as possible. It was necessary also that I explained in detail some of the terminology.

By the end of the week, Friday, October ninth, paving of all roads and cul-de-sacs on the Mandeville job of Unit 1-B and on the Teichert jobs Units 1 and 2 had been completed. The last base course had been laid on Unit 1 October sixth and, after securing passing compaction tests, Richard Glass left the job. There were, however, some special roads to water tanks and lots of patching still to do. The last of the long dikes were laid October fourteenth, but there were several courts and sharp turns still to do.

On October sixth in the late afternoon the paver broke down on Randall Street, Unit 1, and eight loads on waiting trucks could not be used unless they were saved by spreading from the truck tailgates and blading. Having been against this same situation before, I told them to go ahead—which was done—and it was bladed pretty well to inch and a half depth as a leveling course, and the temperatures of the mix happened to be good enough that they could do the blading fairly well. It was then compacted by the steel roller and the rubber-tired roller. There were a lot of uneven places, but these were taken out fairly well [in] following days by using small maximum-size mix heated very warm. Erik Beyer, the district engineer, continued watching the paving on the Mandeville job, Unit B, until it was finished and Nevada Paving, the subcontractor, moved out. This relatively short section was finished in two and a half days.

October seventh was a very cold day and I requested superintendent, Athel Smith, to call the Truckee plant and send out the loads twenty to thirty degrees warmer than was usual. Hot loads were necessary to do at least a fair job with a thin layer over yesterday's blade lay of eight truckloads.

One pretty bad accident occurred this day. In the late afternoon, Ed Strike, the paver operator, got a foot caught in the propelling chain, which shattered the heel bone. He was rushed to a Reno hospital. I called on him where he lived up in the south end of Lake Tahoe a couple of weeks after, but he'd recovered enough by that time so that he'd gone somewhere that particular day that I called.

Early in the morning of the same day Ed was hurt, I spent a half hour or so doing the chalk walk over the latest paved areas and marked several areas which needed repair with a fine grade mix to fill "bird baths" (or low places) against power boxes and low places against fire hydrants. Teichert had the responsibility of paving the water tank road above Mandeville's 1-B project. I walked over it, and found an open water main trench only partly filled. These trenches would need filling and compaction. I also found the road so steep and with such cohesion of fine decomposed granite soil that it would require [a] caterpillar on tracks to pull trucks up the hill. I reported this to Athel Smith. This was another long working day, eleven hours.

On Thursday, October eighth, I made a chalk walk upon arrival; I marked a few paved places on Randall that looked a little ragged and would require that such areas receive an extra heavy seal during the seal coat operation. I had to restake a part of Jennifer and part of Fay where trucks had knocked most of the stakes over and destroyed them. I

also staked the parking bay on Jennifer, which was opposite Fay.

In later afternoon, the paver was to be moved to the water tank road above Unit 1-B. The fifteen-foot-wide road was so steep, the trucks with the asphalt mix had to dump loads on a flat area down below, where it was then picked up by a three-yard loader and hauled to the paver and dumped just ahead of it. The loader was headed downhill so it wouldn't have to be pulled upgrade.

At three o'clock in the afternoon, Don Bruner, now in charge of the dike construction, asked me to help him measure the dike on upper Unit 1 for payment. This we did with a measuring wheel. I held the wheel out the open door, while Don drove the car at a speed of about twelve miles per hour along the side. Dike paving was paid for by the lineal foot. The total measurements of dikes for the day was 8,888 feet. To have taken these measurements on foot [chuckling] would have required three times as much time.

My duties on this job at this time of year were the equivalent of a full-time resident engineer plus those of two inspectors; however, I enjoyed doing it and especially with cooperative Superintendent Athel Smith and his crewmen.

The hot plant at Truckee broke down at about one-thirty in the afternoon. Fortunately, however, the last truck load of hot mix sent from the plant was just barely enough to finish the water tank road by two-forty P.M. Due to steepness of grade, the paving was rough and cracked in some places. This, however, could be repaired with fine mix, then sealed at a later date.

On Friday, October ninth, Don Bruner's crew continued with the dike machine, and Dutch Watson bossed a cleanup and patching crew. Superintendent Athel Smith, however, was on the job all day and personally

supervised placing the big patch on Jeffrey in the wet spots which I had marked with keel on an earlier chalk walk.

Dutch Watson's crew with a flatrack and backhoe began digging up the pavement and the wet material underneath. I then had a big surprise. A drain of perforated metal pipe partly surrounded with drain rock was already in place. This I did not know, nor did any of Teichert's men, as the installation apparently had been made on the pioneer road a year or so earlier. Because a pavement failure was due to clogging of the underdrain which had been place too far inside the roadway area which had been paved, and the coarse rock surrounding the pipe had been filled and clogged with fine soil in the subgrade, the ground was thus saturated with water from the spring above. This required almost a full halfday's work with a big crew. All of the broken pavement had to be pulled out and hauled away and dumped, the pipe had to be taken out and cleaned, and the coarse rock was taken out and wasted. The trench was redug and refilled with rock, pipe re-laid, and the whole thing paved over again with hot mix, and the work was all completed by about twelve-thirty. Compaction, of course, was by a power roller (vibratory roller) and I furnished Erik Beyer with the data for preparing an extra work order so the contractor could be properly compensated. In the afternoon I staked several parking bays so that they could be properly paved. The bays I staked were all paved by four o'clock, at which time I left the job site due to a five o'clock appointment in Carson City.

Monday, October twelfth, I traveled up and down all of Unit 2 and found three crews working at raising manholes, cleanouts and valves to coincide with the pavement surface, and patching around the varying structures with hot asphaltic mix. Dave Pond was in

charge of this operation on Unit 2. I was glad to have him there, as I had all I could do on Unit 1 and 1-B.

Raising electric boxes on Unit 1 and placing of dikes on Unit 1-B were carried on most of the day. The dikes were being placed on the Mandeville job by subcontractor Nevada Paving. This did not require the paving machine, but simply a small dike machine which used hot mix usually shoveled off by hand from a truck nearby. Bud Haynor was the foreman for this job.

One of Mandeville's crews was busy hand-laying rock lining side ditches on the fire road. This fire road was not paved but had to be put in usable condition with drainage water carried away in the rock-lined ditches on the side. Another of Mandeville's crews was placing fine topsoil over some of the decomposed granite slopes. This was done to make better seedbed for the slope seeding, which would be done by Boise-Cascade later.

The next day I made a chalk walk over all the Mandeville job and marked places needing further attention. At eight o'clock in the morning I borrowed the measuring wheel from Athel Smith and measured 2,833 lineal feet of dike for pavement on a Mandeville job. I did this by walking with the wheel. Another seventy-one feet of dike was placed at request of Mr. Mandeville as a buffer in front of a guardrail on Harper. The guardrail had been erroneously installed by him at too high an elevation. The dike buffer in front of the rail would thus remedy the dangerous situation the high guardrail might entail. This seventy-one feet of buffer dike is on Mr. Mandeville, as far as I in concerned. I was not the inspector here when the guardrail was installed.

Part of my time this date was spent with Ed Gray and Don Bruner on Unit 1 where paving of lower tank and pump house road was followed immediately behind the laying

and compacting of base. Compaction of base appeared okay, but no compaction tests could be taken, as Richard Glass had moved out of the territory. Because of the steep grade, regular paving equipment could not be used. A three-yard loader would deliver hot mix from the truck to the roadway where labor was used to spread and to level the mix by hand-shoveling and raking. This worked pretty well. Use of the small vibratory compactor compressed the mix fairly well. The resulting fifteen-foot wide road was not extra smooth, but would suffice for what little traffic would be on it. Such traffic would have to be low-gearred in order to make the hill. A rough sketch is included with a copy of my daily diary for October fourteenth, which can be placed in the University Library files. *

The next several days were spent by the crews on Units 1 and 2 in miscellaneous work and cleanup. I conferred the early morning with Athel Smith relative to the day's work. Athel was worried about need for more dikes than were specified on the plans. So was I. Don Bruner and I went over these more critical areas and made a record of our observations. On October sixteenth, District Engineer Erik Beyer came to the job and after a brief conference with Athel Smith, Erik and I traveled all over Unit 1 and a portion of Unit 2 and Erik agreed that the dikes recommended by Don Bruner and me should be put in. Erik and I noted several spots in paving to recheck, and I marked them with yellow keels. I spent considerable time with Don Collins's crew this week. Don was resetting water services that had caved in, and he was attending to many miscellaneous details which had been marked by Erik and me on the chalk walks. Further measuring of dikes placed on Unit 2 added to measurements already taken, but not including work with the small dike machine, gave a total of 28,927 feet.

This included, of course, the dikes on both units and [one] is not surprised at the mileage when you realize that Unit 2, the largest of the jobs on which I worked, contained, I believe, 503 lots, and Unit 1 contained about 300 lots.

On October sixteenth, Athel Smith appeared with the foreman on the Shea job, Unit 4, and explained to me that they had discussed certain patching and paving and dikes near, and within the area, where the two projects adjoined. Smith would continue certain drainage work over into Unit 4, and Shea's crew would in 1971, finish some patch work inside the boundary of Unit 2. It appeared to be a fair trade, and I so notified District Engineer Erik Beyer.

On Monday, the nineteenth, I reviewed all patching and paving around raised manholes, valves, and power boxes thus far finished on both Units 1 and 2, the patchings continuing on Unit 1 under Don Bruner. Manhole cleaning and raising was in charge of Don Collins, and Clede Smith's crew was raising electric boxes and doing cleanup.

Dry rubble masonry was also placed on steep slopes in water and sewer service trenches leading up steep cut slopes to lot property lines. This was necessary, whether shown on the plans or not, in soils of pure cohesion and susceptible to erosion. Where such slopes were extra steep, the rock masonry on the trenches was made solid by treating with sand cement mortar.

There were no daily reports for October twentieth, twentyone, and twenty-second due to foul weather preventing work. Weather marked for October twenty-third on my reports stated that the sky was overcast and the weather was cold, and there was snow with the storm period starting at about eleven

*See Little papers, UNR Library

o'clock in the morning. Work ceased that day at twelve-thirty. I covered Units 1 and 1-B that day and found the seal coat on 1-B looked good but pavement on Harper had not been repaired this had been damaged by Mandeville's trucks driving at high speed over the paving. Athel Smith had ordered that the water line pressure reducing manhole stations be protected from storm water by paving with fine three-quarters maximum size mix. This was done and the paving was finished around eleven-ten A.M. Bruner's crew was working furiously in the snow to do as much of this paving as he possibly could, but by twelve-fifteen he had to stop. There will be remaining areas to finish later on. It had begun snowing hard at that time, and the crew and the inspector left for home.

October twenty-six and twenty-seven were cold days, but the contractor worked nine and a half hours each day. My principal observations on the twenty-sixth and part of the morning of the twenty-seventh had to do with water services and need for erosion checks' on the steeper cutbanks. I accompanied Athel Smith, checking all of Unit 2 water services, and we counted about a dozen which needed attention; some had broken services boxes, some of the boxes were without lids, and the others had already lost trench fill by erosion. In the afternoon checks on the water services on Unit 1 showed similar troubles with nine services. Athel Smith took charge of the repair crews, assisted by acting Foreman Cecil Townsend. Final detailed inspection of these water services will be made by Dave Pond, inspector.

On the morning of October twenty-seventh, some of the water services for the lots below the roads were hard to find because they were covered by snow. The water services, of course, but never the sewer services could be above or

higher than the lots, but the lots below the road could have their water services along the road, and those were sometimes in fill sections. Athel Smith said about this snow-covered area, says, "Waste no more time on them now—when the snow melts they'll be easier to find."

Most of the day was spent by me observing the paving around utility boxes on Barbara and Jennifer streets on the lower part of Unit 1. The gas people had dug three trenches through the pavement on lower Tyner on Unit 2, trying to find the gas leak. The trenches had to be refilled with soil, recompact, new base placed and compacted, then new paving added. The gas company was expected to compensate the Teichert company for this work, as they actually laid their own pipe and should have had it tested earlier in the year.

Ambient temperature got no higher than forty-one this date but the temperature of the asphaltic patching mix held very well during the patching operations.

October twenty-eighth, I spent the first half of the morning on water services and paving around utility openings on the upper part of Unit 1. Later the patching crew went to Jennifer, and I observed them until they had patched all openings of Jennifer from Barbara to Geraldine, Geraldine to Randall, and on Elm Court and the Geraldine-Randall intersection. This intersection contained ten openings in the pavement, all of which received paving and proper compaction. At about four-thirty, the crew finished with the asphalt patching and spent the remainder of the day on cleanup.

I accompanied Erik Beyer in making the punch list inspection on the Mandeville job during the last working hour of the day. Erik and I finished the Mandeville job punch list by ten o'clock in the morning, October twenty-ninth, after which, I went to Unit 1 at Randall

and at Ida Court, where asphalt paving was being placed around raised utility openings.

The punch list on 1-B contained thirty-eight items for completion. Most of them were very minor such as uncleaned manholes and dirt flowing from shelters and missing reference stakes and so forth. The rest of the day was spent by me placing the seal coat of the grade, called SS-1, and that was placed on the pavement, leading up to the water tanks and pump houses on all three projects—1, 2, and 1-B. Because of the surfaces of these paved places, which were rough, as much as two-tenths of a gallon per square yard of the seal had to be used in order to be effective. The finished job really looked pretty good!

I arrived at Athel Smith's office at seven A.M., October thirtieth, and spent ten minutes discussing the day's program with him. The day's work emphasized raising remaining utility openings to pavement surface, paving the scarred surface, and doing more sealing on some of the pavement stretches which had not been covered.

Dave Pond came from Erik's office with my copy of the punch list on the Mandeville job. I was to check on Mandeville as much as possible. I visited him at mid-morning and found him in bad sorts regarding the punch list [laughs]. He had one laborer with him and he had already started making the necessary corrections. I returned to Mandeville's job in the afternoon. By that time he had finished work on the first twenty items. He apologized for being out of sorts on my first trip (they've got to give you credit for some things).

Back on Unit 1, I rode with Cecil Townsend over the area where excavations around the raised utility boxes and around raised manholes and valves were ready for filling with paving materials. There were twenty of them on Unit 1 and three on Unit 2. The paving material arrived in time to fill these

excavations and compact them. Temperatures of the truckload on arrival was high enough so that the last hole filled could be utilized without having seriously cooled too much. All hands headed home, as did the inspector at five-thirty.

Saturday, October thirty-first, was Admission Day, with the usual parade and celebration in Carson City. I performed in my usual band stunts; I was in the parade with the Shrine band in our decorated "pansy wagon," and in the afternoon joined the Reno Municipal Band in a concert on the old post office lawn. We had no visitors at our house on this Admission Day.

According to previous agreement work did not start Monday, November second, until eight o'clock. In covering possible bad places, I noticed leaks in pavement in several courts— notably in Ellen Court, Unit 1, and Jill in Unit 2. Storm water had seeped through the paving, flowed under the dikes, and was making small gullies in the fill embankments on lower side of courts. I recommended that an extra heavy liquid asphalt seal be placed as soon as weather would permit. I found a deep inlet on Dee Court which was clogged with debris, and reported same to Foreman Clede Smith.

The state Highway Department had kept a maintenance man, who quite often patrolled the Mount Rose road to check Teichert's adjoining operation. The contractor had to provide adequate drainage structures emptying into the Mount Rose grade system. The contractor also had to retain hillside slopes along Mount Rose highway, which had been disfigured by his operations. Some correction work of this kind was under way there this date. One twenty-four-inch corrugated metal pipe tee alongside Mount Rose highway was being prepared by one crew for riprapping.

Erik Beyer had gone over the upper and middle areas of Unit 2 making a punch list: He found me along the Mount Rose highway and assigned me to accompany Clede Smith's contractor's foreman on much of Teichert's pipeline work and services. On the corrections to be made as shown by the punch list, that was a job that we undertook right away. In the meantime Erik continued making punch lists on the lower side of Tyner.

We started the work November third in earnest at the upper end of Unit 2 first, and there, of course, on Marlene Court and Street. Besides Clede and myself, there was a backhoe operator with a small hoe and a truck driver operating a flatrack for hauling away any waste material and for hauling in more material if necessary.

Items on the punch list which gave the most trouble were water and sewer services on, or just below fill slopes. The backhoe was a great deal of aid on these services. Erik could not find some of them, but the backhoe operator was a skilled one, and uncovered the missing ones, and did most of the covering with soil where necessary. Some of the water boxes were entirely covered by soil and others needed more soil added around them. Some laborers had to be added to the crew. We made it down the line as far as Station 10 + 00 on Dorsey by quitting time. My notes on repairs of punch list items were transferred to the master set of plans.

The next day, Athel Smith sent another crew to work with me. Clede Smith and crew continued on Dorsey, and the second crew led by Swede Bell took over on Tyner. Athel Smith accompanied the Bell crew and helped me by making notes on corrections. It started to snow early; it was more or less continuous, which made it difficult to write notes. Again the worst problem was with dirt and rock work cover over water services

and fill sections. Workmen directly under BoiseCascade had handled these items, and had done a poor job. Difficulty was encountered in locating some of the sewer services, and some of the fire hydrants had not been properly raised. The job was shut down for the day by Athel Smith at twelve o'clock—too much snow. I would have to get with Swede Bell and Athel Smith as soon as possible to obtain their notes for review. I could not very well watch all operations of two crews working in separate places.

According to my diary notes, there was no work November fifth on account of rain.

Friday, November sixth, began for workmen at seven A.M., but I did not know of this until I arrived at eight. Superintendent Athel Smith, assisted by Swede Bell, had three operating engineers, one truck driver and five laborers using two backhoes, one crane, one truck, and a flatrack. I do not bother to give all this equipment for every day's note, but those items and similar ones were on the job and available at all times.

Superintendent Athel Smith, assisted again by Swede, kept at these punch lists. Again, we found the principal trouble related to water services, on the fill side and where they were being covered by soil. And we also had some trouble with the rubble masonry. This was because Boise-Cascade was using their own crews protecting the power service boxes. This kind of protection was not an item on Teichert's contract. Athel Smith had his dander up because of this fouling of the services and service boxes—and I couldn't blame him. The crews also found two services going to one lot and missing the adjoining one; correction had to be made.

Four tire hydrants had not been raised and corrections were made. There were a number of cross-country sewer lines—such services from the lower end of adjacent lots

which sloped downward from the service roads could not have gravity flow to sewer mains in the road itself. I have mentioned that already. So the sewer mains for those lower lots had to be mains across country through easements. And the manholes and cleanouts also had to be added to those lines the same as they did on sewer lines in the road. Most of the courts and their approach roads on Unit 2 were cared for this date with respect to the punch list items.

Athel Smith closed the day's work at noon due to the beginning of a snow storm. I stayed until one-thirty P.M. and checked work done from seven 'til eight, when I was not present. I also found two more items which Erik had missed on his punch list. One was a bad "bird bath" on the north part of Dorsey, and the other was a missing sewer service for a lot at the end of Laura Court.

While I had the job of checking punch list crews on Unit 2, Dave Pond was with the crews on Unit 1, raising manholes, cleanouts, power boxes and water blowoffs and valves on Unit 1. The punch list on Unit 1 was still to be made after Dave's crews were finished. We began to wonder if we could possibly finish both Units 1 and 2 before the weather would close everything down.

Monday, November ninth, the same crews with about the same equipment continued with the punch list items on lower Tyner and adjacent courts. The same kind of trouble mentioned for last week continued on down the grade. Much of the day was spent by Swede Bell's crew on the cross-country sewer lines. There were twenty of these lines on cross-country easements checked on this date, and there were still more to do. I checked all of them and okayed them; I also noted that the redwood markers at wyes on these mains were all in. These redwood markers are two-by-fours, four feet long with one end sharpened,

and they're punched into the ground, not by hand but by a loaded bucket of a three-yard loader. The property owner can thus easily find locations of the wye when he is ready to connect his sewer line to the main. Redwood, of course, will last for years and years and years. Some of those lots, of course, were not even sold yet and it might be ten or fifteen to twenty years before some of them have to connect with the sewer. The actual building of some residences on these hundreds of lots was beginning, while the road and utility mains were under construction. It was noted also that a high percentage of the lots had been sold.

Enough of Unit 1. Project 68-2 has at least been theoretically finished by November ninth, so Erik had prepared a partial punch list. This work on punch lists was divided between Units 2 and Unit 1 on November tenth. I spent from two hours in the morning until about noon, I guess it was, with Clede Smith checking more cross-country sewer mains on Unit 2 and some water services on lower Tyner. Eight of the sewer mains were checked and seven found okay in all respects. The line between the Mount Rose highway and the north end of Gayle had the sewer service missing for Lot Number 10. Four water services (that is, the boxes for four water services) on lower Tyner would have to have excess soil removed to a depth of about six inches from around the top box to give the property owner easier access. A crew on Unit 2 was making pavement and dike repair with a load of asphalt mix on Jill, Dee, Douglas, Laura, and Cynthia courts, and on Marlene and Dorsey streets.

At ten A.M., I went to Unit 1, where hot mix was being used to make minor repairs on Ellen Court and more extensive repairs to pavement on low spots on Jeffrey and a bad place on Randall. All paving repairs listed

above were finished by quitting time. Thirty-eight feet of dike was placed on the low side of Jill Court and fifteen foot of dike was placed on the southwest corner.

Clede Smith and I continued on November eleventh, checking the redwood sewer service markers. We found all markers okay on lines I, H, C, and E on Unit 1, and all but one for Lot 15 in good shape. Swede Bell found A marker for Lot 15 later; it had been entirely covered by dirt.

Swede Bell and his crew were on Unit 2 sealing around raised manholes and power boxes. The county officials had checked the pavement on all parts of Unit 1 and 2 and complained about some high places where patching had been placed. Therefore, the high places were bladed down to pavement level, and they also had to be resealed with asphaltic emulsion. This was an overcast day with some light rain in the early afternoon.

One of the crews covered about half the water services listed on the punch list in the afternoon, making recommended repairs. Clede Smith and I went over them again to make sure that the water services in the connecting facilities—the boxes— were all well covered with backfill to insure against freezing.

November thirteenth was spent by contractor's crews in general cleanup operations on Unit 1. I joined Erik Beyer, district engineer, on the detailed inspection tour of Unit 2, reviewing first what had been done on the upper end of the project then continuing downhill covering courts principally, as most repair items were in the courts. Pavement openings for raising manholes and other structures were given special attention. Erik was called away in the late afternoon, and I spent the balance of the day reviewing work by the contractor on lower Tyner water services and some of the cleanup on Unit 1.

Boise-Cascade had been busy with a slope seeder, seeding areas along slopes which had been completed by Teichert. The seed and the pulp mixture (I believe it was wood pulp) was blown along the slopes with seed-pulp ratio supposedly well controlled. The seed-pulp mixture adhered quite well to the slopes when first put on. The process worked best if the slopes were quite moist; this presumably was a requirement by ecology-minded officials. Observation of the effectiveness of this operation was made many times by me during the next two or three years. My reading of effectiveness was about ten to fifteen percent. The grass seed usually sprouted, but spring runoff from melting snow piled some of it at the bottom of cut or till sections. Dry summers were too tough for the new grass seedlings to survive to any appreciable extent.

Erik and I continued the punch list 'til November sixteenth, and the contractor's crews under close supervision by Athel Smith and Foreman Clede Smith and Foreman Swede Bell started on that punch list at the top of Unit 2 and covered Marlene, Sherry, Dorsey streets and courts, Dorothy, Karen, Cynthia, Douglas, and Laura. However, they missed quite a number of the items, probably because recent storms had concealed items especially on shady north slopes. Thus only part of the punch list items were finished.

Erik had gone over Unit 1 without me on the punch list, but copies were given to me and to the contractor; thus on the seventeenth and eighteenth the contractor continued with the many punch list items. To get as much as possible done before winter shutdown, Athel Smith split the labor and equipment into four groups. He headed one crew and the three foremen, Smith, Collins and Bell, took charge of the others. There were two crews on each project. Items on which more work was done

were of the usual variety; the areas needing patching of pavement and dikes were well marked and were cleared up, usually without necessity for further work.

Missing water or services sometimes could not be found because of frozen ground, and would have to be checked in the spring of 1971. Considerable rock work, especially over service trenches on steep cut or fill banks had to be done. This involved hand-laid rubble—no mortar added at this time of year on account of freezing. Where mortar was required, such work would also have to wait for spring weather.

Most of November nineteenth was occupied in cleanup and attention to miscellaneous odds and ends where snow and frozen ground did not interfere. At the end of the day, all crews and foremen, except Don Collins and his crew, were dismissed.

Prior to November twentieth, the punch list for Unit 2, Project 69-3 contained a hundred and twenty-three items needing further attention. Sixty-three of them were on Tyner Street (the longest street), and fifty-nine others were scattered among sixteen other shorter streets and the courts. The list for Unit 1, Project 68-2, contained seventy-three items; Geraldine, Randall, and Jennifer streets, containing respectively eleven, sixteen, and nine items. The remaining items were divided among the other streets and courts. Quite a number of these were finished, or partly finished, by November twenty-fifth when the job was shut down.

November twenty-third, Erik was given the list of all the partly finished or completed items from which he could compile a master list to be finished in 1971. Saturday, November twenty-first, I spent four hours compiling the list of these unfinished or partly finished items, describing in much detail what had to be done.

On Monday, November twenty-third, I arrived on the job at seven o'clock, as this was to be a day of reckoning, so to speak. In referring to my notes, I found four long pages full of items. I will try to tell in as few words as possible what they were.

I went with Athel Smith to the upper end of Unit 2 and pointed out need for a rock-lined outlet for a corrugated metal pipe tee, which carried drainage down an easement and would pick up water from the Marlene-Tyner-Dorsey intersection; otherwise, bad erosion would take place along the easement. A laborer was put on this job.

Next, we toured all cul-de-sacs below Marlene for needs, for seal coats. I called Athel's attention to piles of earth on Dorsey and Laura courts—resulting from excavation from around flanges of fire hydrants.

At ten-thirty, I met Don Collins who had joined Erik and Athel with other Teichert people and county representatives. They were on an inspection tour which had been previously arranged, probably to show the county people what had been done and to receive their comments. I had too much to do to stay with them.

At eleven o'clock, I donned my rubber waders, and by aid of a flash lantern explored the interior of a perforated metal pipe at the junction of Jeffrey and Juniper on Unit 1. Mortar in the joints between the lengths of pipe had been poorly placed originally, and had to be removed and replaced. I found the workmen had done an entirely acceptable job this time.

Shortly after eleven-thirty, I joined the crew Don Collins had started on sealing around pavement openings. This seal was with emulsified asphalt. The work was being done on Unit 1 on Geraldine, Jennifer, portions of Randall, and on several courts, and continued most of the day. At three-thirty, however, they

moved to Unit 2 to Tyner, where previous sealing had been missed at several locations.

I learned from Athel and Erik that the county people were not satisfied with the slightly high places around raised manhole valves and power boxes. However, this was purposely done to keep snow plows from striking the metal covers. The county insisted that the area be recompacted, and if necessary, the covers lowered. This would take some doing! It would be impossible to do until warm weather, provided it was provided in the summer of 1971. I never did hear how this controversy was finalized, if at all.

Don Collins's crew spent some time in the afternoon raising water valves which had been pushed down by heavy equipment (probably the giant loaders and seeder trucks operated by the Boise-Cascade crew). Collins was also continuing sealing right up to five o'clock and wanted to finish a few more places. However, Nevada Paving, the subcontractor furnishing the seal material stopped work at five sharp [laughs].

I arrived at the contractor's office at six-fifty A.M., November twenty-fourth, and found no one present. I waited until seven, then went up to Tyner where I found a crew placing riprap using large stones around the tees and CMP outlets, as requested by the county yesterday. The county had five such places on their punch list for Unit 2 and four on Unit 1. These rocked-up areas at corrugated metal pipe outlets would aid in distributing and cutting down the speed of outflow to some extent. This should appease dyed-in-the-wool ecologists, for in theory, it would curtail erosion of the landscape. In the afternoon, work was continued sealing around raised manholes, boxes, and so forth, but Nevada Paving ran out of seal material at four-forty so that ended that procedure. Since a storm was about to get underway this

date, "May be the last working day," so said my notes.

November twenty-fifth came without enough storm to interfere with work. I arrived on the job about seven-fifteen and found Don Collins and crew at the intersection of the Mount Rose highway and Fay Street on Unit 1. They were cleaning out one end of a reinforced concrete pipe and a drain ditch. The pipe was a state structure under the Mount Rose highway, but had collected outflow from Unit 1. Another small crew was removing boulders and stones which had slid down the embankment adjacent to the upper end of a multiplate pipe under Jennifer Street on Unit 1. Operations had been going smoothly, when it began to snow. Soon the snow was coming down in thick swirls, so it was useless to continue to work. Thus November twenty-fifth, the Teichert contract was shut down for the winter.

There were lots of items left for the 1971 season. And there were some real problems which occurred during the wintertime, so that in the spring of 1971, quite a few washed-out places and other areas had to be repaired. It is my understanding that because of this, Teichert did not fare so well moneywise on this contract; as a matter of fact, they lost some money. However, they're a big outfit, and they have plenty of jobs going, and what they lose on one they can usually make up on another.

In the spring of '71, I visited the place at the time the water was causing the trouble. Dorothy Court was a fairly large court, with a fairly steep road leading down to Tyner. And above Dorothy Court, there was another very steep road only partially paved, which gathered water from a cross-country line—that is, from the surface of where cross-country sewer line had been put. This accumulation of water made quite a volume

when four feet of snow mounted rapidly. And that was one of the reasons for the washouts. Another reason was that this was a very badly broken-up area with small fault scarps here and there, and these seams would fill with snow water and some of them would be under the paving along the edge of the road, and the pressure of water in these seams would raise the paving, thus the surface water would dig it out.

Units 3 and 1-A were finished in late October or early November, and John Stanley finished all the inspection on those items.

I have [gone into a lot of detail], but you have to do that in order to explain just what happens on these jobs. All construction projects are gone over by inspectors and engineers to find flaws. They find them, and they miss some, and they have to be gone over several times. Something may appear to be all completely finished; then something will happen. Someone comes along with an extra big rig and he will break some concrete work. Or a backhoe operator is told to trim the slope a little better than had been done, and he may catch his bucket in the top of a concrete water service box and pull it apart. Or there may be something which happened in paving which wasn't seen. Sometimes a high place or a rock in the grade will cause dirt to pull up and push up, yet some places, it doesn't quite get to the surface and is not seen; but the first time a few heavy loads of traffic goes over it this spot becomes a pothole, because of a little tiny bit of paving over the top of it is ruined and there is always dirt underneath. Those things happen and have to be repaired.

I can find no records at this time (March 1976) relating to my experiences between November 25, 1970 and February 25, 1971 except two notations in my 1971 "daily

reminder" book. One on February twenty-one reminded me that it was my wife, Ruth's, birthday. The other dated Wednesday, February twentyfourth for the notation, "session with Mary Ellen Glass on oral history one-thirty P.M." Apparently this was our first session. There were quite a number more—one per week—until I became sewed up with inspection of construction projects at Incline and other duties. This occurred about May eighteenth when I went to Incline and kept on continuously 'til November sixteenth, when the job I was working on at that time was closed down for the winter.

* * * * *

In 1971 the records show I was quite busy. I worked on two small projects which I handled as a private professional engineer, and at Incline, I worked for the district inspecting paving of roads and paving of parking bays and footpaths on the two parks, Burnt Cedar Beach and Incline Beach. Immediately afterwards I started inspection on Unit 4 under contract to the Shea Company of Redding, California. In addition, I attended all practices and concerts of the Reno Municipal Band from May until October, plus Admission Day, October thirty-first. Exception to the band work was all the month of August, at which time I had long hours to spend each day on inspection.

John Isbell, the youngest son of C. V. Isbell, who for many years headed the Isbell Construction Company, had been interested in gravel and other production during the past several years. He called me February twenty-third, and asked if I would look over some properties between Dayton and Fernley, and evaluate them as potential material sources. John was living in the Isbell property, just south of Glenbrook at Tahoe at the time.

He picked me up February twenty-fifth. We examined the gravel operation east of Dayton and just east of the Gold Canyon road. We also looked over gravel production west of Fallon at Tedford's plant, after which John took me into an area he had purchased near Fernley. Some of this latter had been cleared of brush and some shallow excavations had been made. These particular areas consisted of rolling small hills with intervening gullies. There were gravel caps a few feet deep on some of the hillocks, but only sand below. I told John he would never be able to get quantity production in such an area. I told him I would show him the best gravel source in Washoe County; it was on Indian ground northeast of Wadsworth. I also told him that I had known of this deposit for many years and wanted to secure it for the state Highway Department. I was never able, however, to convince the Highway Department right-of-way boys that they should use every way possible to get some kind of a valid use permit from the Indian Service. I was always refused with the answer that it would be "impossible to deal with the Indian Service." I knew that John Isbell might have a good chance to deal with them because his father had always employed quite a few Indians on his contracts, and had treated them well. As a matter of fact, some of these sane experienced Indians were now employed by Byars and by Teichert after Isbell Company had gone out of business.

I took John to places I had dug some prospect holes in the area, and he liked the looks of the ground. I told him my tests had shown excellent quality for concrete and for base and surface aggregates. I told him I was sure the deposit embraced several hundred acres, and although not prospected at depth, the formation was a huge alluvial and lacustrine deposit containing one area which appeared to be a partially eroded ancient glacial deposit.

John said that he would see what he could do with the Indian Service—as to cut some of the red tape and secure a long time use permit on a royalty basis. I told him to keep after it and suggested a prospecting project covering the best appearing parts of the area, once he could negotiate a valid agreement.

I pointed out the principal areas which should be prospected. We drove on to Reno in mid-afternoon and visited briefly the new Bureau of Mines, then examined a quarry site in the Peavine foothills. I told John that working a quarry site was so expensive that it could not compete with aggregate production from a good gravel pit. John agreed.

This Wadsworth deposit could have tremendous potential for future construction in the Reno area. At the present time, I told him, it could not compete with aggregate production in the Truckee Meadows, because of the long haul distance. However, with the advent of ecology-mindedness of local people plus the continuing building proliferation promoted by aggressive real estate operators, aggregate production in the Truckee Meadows area would eventually cease. When this time would come, the Wadsworth area could have its heyday. John told me he would be getting with the Indian Service and the Nixon Indians right away to see what kind of a deal he could get.

I spent most of Friday, February twenty-sixth, at the main Highway building reviewing biennial reports 1918 to 1932, making notes for our next session with Mary Ellen Glass. That evening Ruth and I went to the Country Club, southeast of Gardnerville for one of those excellent Basque-style steak dinners. We met two of my former high school students from the 1924 to '29 period. Swede Russell, at the time Colonel Russell, deputy director of Selective Service, was one of the two. The other

was Laverne Rollins; she was known to me as Laverne Bradley in her high school days. At present, 1976, Swede is retired, and Laverne is employed, by the University of Nevada as a special writer in research. She did at one time a lot of travel and wrote articles for the *National Geographic*. She was a good student.

My diary notes show that I attended two Shrine band practices March ninth and a Reno Municipal Band practice March tenth. The Shrine practices were to prepare for the Jiggs Dinner, which was held at the Masonic Temple in Reno, March thirteenth. This time of year was pruning time also, and I trimmed some of my fruit trees. There was a Saint Patrick's Day celebration in Reno, Saturday, March twentieth, and I joined the Reno Municipal Band in the parade.

My diary notes show only band dates and a session with Mary Ellen Glass—the last dates shown for the Oral History session was April fourteenth, and it probably was the last one for this year, as I began to get involved in special projects and funerals after that date.

John Isbell called me in the afternoon of March fifth and told me he was doing his best to get some kind of agreement with the Indian Service relative to the Wadsworth deposit, but said the red tape was getting pretty thick. He had maps showing the Pyramid Indian land. I sent him by mail copies of 1959 tests of the gravel samples I had taken at the time from the Wadsworth area as I had previously referred to.

John Isbell called me April sixteenth to accompany him to the Colfax area, Saturday, April seventeenth, I drove to Isbell's residence at Tahoe, left my car there and drove with John to the Colfax area. We spent most of the day studying the milling of special quartz, obtained from Greenham Creek. This milling operation was done by the Terrex Company. Quartz, when properly milled, is used in soap

products, probably because of its scouring action.

John Logan was manager of this Terrex operation on the job there and Benjamin Z. Katz, the president. Terrex Company's chief interest, of course, is the white quartz. Both white and black aggregates in about a fifty-fifty ratio occur in the Greenham Creek bed, and separation is done partly by mechanical means and partly has to be done by hand. John Logan said a firm market for two hundred tons per day is possible if they could only get that much. Inch and a half- to two-inch size white rock is used for the grinding operations. Eight miles of Greenham Creek contains, according to estimates, about twenty-seven million yards of good material.

The Terrex Company gave a purchase price, said to be two hundred and seventy thousand, and had about a hundred and fifteen thousand to pay. They would deal on a joint venture proposition if it could be put together properly. It was eleven and a half miles from the plant on Greenham Creek to the railroad at Colfax, so there would be a considerable dead haul to get the material loaded on railroad cars.

These people wanted to deal as soon as possible; they wanted to get the show on the road. They had discussed the thing with seven different outfits. The APCO Oil Company works with John Isbell (or rather he with them), and the APCO company would be the company if the deal goes through to get with this job. There was new machinery developed by a man named Phillips, which will pick out flat pieces as well as colored pieces, and it was said to be ninety-two to ninety-four percent efficient. And that would increase production by a considerable amount.

The cleaner industry requires whiteness in their products and this particular quartz gives the best whiteness of any other quartz. We

looked over possible haul areas and checked loadcarrying capacity and estimated load-carrying capacity of several of the bridges. We spent some time watching a gravel operation near the job, and we decided it was time to go on home. We made it back to John's residence by about five P.M. I never heard for sure that anything happened on this with respect to the APCO company on this project.

April eighteenth was an extremely cold day for the time of year; twenty degrees was the nighttime temperature. There were two funerals Monday, April nineteenth, [that] occurred at the same time. We attended Julia Peterson's services, then made it to the cemetery in time for the cemetery service for Mrs. Harvey. Mrs. Harvey was the wife of John Harvey, who had passed away earlier and was a minister at the Presbyterian church for many years and was the first president of the Carson Rotary Club. We were long standing friends of both the Harveys and the Petersons.

Mrs. Peterson outlived her husband, Ed Peterson, a past Grand Master of Nevada Masons and a long time employee of the V & T Railroad. Mrs. Peterson was one of the daughters of Mrs. Martha Shulz where I had taken board and room as a single man my first two years in Carson City. Mrs. Peterson's uncle was a [G. W. H.] Ferris, inventor of the Ferris Wheel.

The Reno Municipal Band was slated to play for the opening baseball game, Reno against Stockton at seven o'clock April twenty-third. I made the trip to Reno to find the game was called off at six-thirty P.M. and I drove home through high winds and snow storm in Washoe Valley. There was an inch and a half of snow on the ground at seven o'clock the next morning, and cold and cloudy all day.

The morning of April thirtieth I made a sixty-four-mile round trip to Incline Village

headquarters to check on work for the summer. Cold weather had delayed the start of work; it probably would not begin for about two more weeks. Upon arriving home, I had a phone call from Tom Cordova, who had been my geologist but was now operating a private geological exploration company, called Earth Science Consultants. Tom was calling from Happy Camp Forest Lodge in California, adjoining the Oregon state line. He had an exploration going on up there. He wanted me to take over a job east of Sparks, which he had contracted for, but he was too busy on his present project to take care of it in time, and it needed immediate attention, of course. The job was to explore a hundred-acre parcel at Vista, just east of the Bob Helms gravel pit and located on the Baker ranch. It was under option to some entrepreneurs who had hired Cordova to do the exploration.

I told Tom I would take the job at a hundred dollars per day and expenses provided it could be done in a week or less, as I was obligated to work in Incline in about two weeks. I would be working directly for Tom; thus he would have to pay for any equipment and equipment operators I would hire. I was familiar with the area, as my materials survey crew had done work near there for the state Highway Department. Tom told me that to go ahead and he probably could finish where he was in a week and would be back in Reno in about that time. Tom told me to contact Mel Moody in Sparks for details concerning the job. The potential owners wanted to use the area for gravel production depending upon results of the exploration.

On Sunday, May second, I called Dale Jack of Reno to see if he would [be] available with his backhoe this week. But I told him I would look over the ground before letting him know for sure. If the ground were wet, he would be unable to use his rig because it was on rubber

tires. Dale had done assessment work for me on the perlite mining claim for several years and was a good operator.

On Monday, according to a tentative schedule, I had already arranged, I arrived in Sparks at eight o'clock. I contacted Mel Moody and he introduced me to the boss, whom I presumed had a hand in the deal. I secured a drawing of the Baker ranch area at Vista, and Mel sent Ed Feutsch to go with me to look the area over. We drove to Baker's ranch house, where Mr. Baker got his jeep out to drive us over the area in question. We found the area (or part of it) was under irrigation, and Baker had a number of cattle pasturing in there. He had leased the pasture to a Fallon cattleman. This would make a double-barrel problem for me. Test pits would have to be sampled, logged, and backfilled immediately, after each one was dug on account of danger of cattle falling into the holes. And this could not be left for further examination, which is the usual practice. Also, I would have to get a backhoe on tracks, as a rubber-tired rig could not cross the sloughs and ditches without getting bogged down. There were enough reasonably dry places, however, to satisfactorily prospect the area.

I would need about forty cloth sample bags and tried several places but without success—I could not get any anywhere in Reno at the time. I called Dale Kulm, assistant division engineer at the Highway division office, and he had no extra ones. I called Jim Sullivan at the Carson Highway laboratory and got the loan of fifteen, which would be enough to start the job.

The best approach for getting equipment on the job would be through the padlocked gate adjacent to the frontage road along Interstate 80. Mr. Baker said the key was lost. We obtained the padlock number and Mr. Baker succeeded in getting an additional key, which I picked up at his place at five o'clock.

I spent most of the afternoon locating a suitable backhoe—one that could be available immediately. I called on Earl Games, at his home in Reno, and he sent his foreman, Robert Tennant, with me to look over the ground. Games agreed to take the job, and would have a transport load the backhoe equipped with tracks, and deliver it with an operator at the gate around mid-morning tomorrow. The backhoe could not be delivered until mid-morning because it was at Bowers Mansion. I had already notified Dale Jack that his rig could not be used on account of the sloughs and ditches.

I arrived on the job just about daybreak on the fourth and had staked locations for about forty test pits. The laths with which to do this had been purchased the day before. I tied red tape around the top of the stakes for better visibility, but before the day was out, the curious cattle had knocked most of the stakes down and actually eaten some of the red ribbon tapes [laughs].

The transport with the backhoe arrived about ten-thirty; it was a Hoptoe 300 tractor-mounted backhoe with one half-yard bucket. Corky Sbriglia was the operator. We managed to dig nine test pits this date and I left some of them open regardless of the presence of cattle so that we could get some idea as to the height of the water table the next day. The holes were all logged (that is, the sketches were made) showing the horizontal layers of different materials and their thicknesses and when possible, depth of the water table, and samples were taken.

Corky, the backhoe operator; arrived at eight A.M. the following day. More cattle from Fallon had been put into the field yesterday evening; apparently this arrangement was okay with the people with whom Baker was dealing for the land. Yesterday's holes were all backfilled Wednesday. From the time we

would be finished, each hole would be logged and backfilled before we would go on to the next. However, I had ordered some cloth sample bags and they had not yet arrived; thus after hole Number Fifteen was sampled, we ran out of bags. I then selected about a hundred pounds of each layer which had to be sampled, and left little piles alongside the test hole, so that these piles could be quartered down to sample size when we got proper sacks. Sample size would be about forty to fifty pounds.

Filling of test holes by backhoe is not an easy job—backhoes were not made for filling; they were made for digging. Nevertheless, we made out Well enough to keep the cattle away from the pits—or out of the pits, rather.

The holes nearest the Helms pit were dry because the Helms operation had lowered the water table there. The water table had risen quite high in some of yesterday's test holes on the easterly end of the project. I had to carry samples to my car which could not negotiate a couple of sloughs. Rubber boots came in handy. Samples would be stored in my garage 'til Tom Cordova could pick them up.

This process of excavating, backfilling, sampling, and logging test holes continued through May sixth and part of May seventh. May sixth was not my day. Upon rising early to prepare yesterday's report, I hadn't turned the lights on—I fell over a table in the dark. Mrs. Little had changed the furniture positions the day before [laughs]. On the job, I got the Dodge stuck temporarily in a mud hole. At noon, I spilled hot coffee in my lap. In driving over the area, I forgot about a pile of new laths I had purchased and ran over them, breaking several. After loading some of the samples in my car trunk, something must have happened to the lock; I had closed it in order to move on and I could not load any more samples in the trunk compartment

that day. I had to get a locksmith that evening to get the trunk open. It started to rain about mid-morning, but these were only showers off and on. We continued working 'til quitting time. It was a cold wet day.

Every day thus far seemed to be accumulating more cattle. Those cattle must have come in the evening, all of which did not make operations any easier.

In the morning of May seventh I waited at the gate for corky Spraglia, as he had the key; he arrived at seven-fortyfive. A drizzled light rain had started at seven-forty, but we worked right through it. I wanted to finish with the backhoe as soon as possible and we speeded up operations as best we could, finishing by two-thirty P.M. Thus the total backhoe time was three full eight-hour shifts, plus six hours, making thirty hours total. I could not find out from Corky what the backhoe charges would be, nor charges for the transport which hauled it out there and hauled it home.

There was a total of thirty-seven test holes, but some of them were not sampled, because of high water table or because the entire fourteen feet was all in overburden. A total of about sixty samples were taken, about fifteen of which were from the gravel beds and the others were from various types of top soil and other overburden. These were sampled in case the contractor or the purchaser wanted to know their characteristics. I had to quarter and take samples from nine of the test holed which I could not finish on that date.

The only test holes which were in gravel from top to bottom were those put down in the old Isbell pit area. Good gravel was also found in most of the other holes, but under six to thirteen feet of overburden. I prepared a sketch showing location and numbering of the test holes. I placed it after my rough sketch on the map which was furnished to me. I also furnished daily diaries to Tom Cordova.

Tom arrived the following week and he further checked the depth of gravel by using a resistivity machine. And eventually he removed the samples from my garage and selected a part of them for testing. He did not do this 'til about May twenty-fifth. Actually, there were about eight or nine samples which had not been brought into my garage at the time Tom [Cordova] first arrived on the job, but they were all there on the twenty-fifth.

Marie Russell who had been my chief of office staff in the Highway lab for several years, had an invalid husband, John, who passed away about May ninth. I was to be a pallbearer at the funeral. I had been so busy I got the date confused and appeared at the Russell home in Washoe Valley at nine-thirty A.M. Wednesday, May 12th, and found out the funeral was set for two o'clock on the 13th. I therefore went back to Carson, changed clothes, and drove to Vista and finished the sampling for the Cordova job.

John's funeral services were held in the little Catholic church just north of the Russell home and the burial part of it was in the Carson City Catholic cemetery. The other pallbearers were Jim Sullivan, who was my assistant in the Highway lab, and two of the Pagni boys, who lived in Washoe Valley, and two others whose names I do not remember.

I had a few days to do some yard chores before returning to the Incline jobs. I have always shared my garden plants and flowers with friends and neighbors, and I did quite a lot of this during these days.

We had a nice dinner the fifteenth; we and the Bob Arkells were invited to the home of Vaughn and Maurine Spot ford, who were the Arkells' neighbors in the newly developed area on the hillside above Arrowhead Drive. Mrs. Arkell and the two Spot fords were teachers in the Carson schools. Bob is still in

charge of surveys in this area for the Sierra Pacific Power Company.

I drove to the Incline office on the afternoon of Wednesday, May nineteenth, arriving at one-thirty. I was given sets of plans and specifications for the two parks, one called Burnt Cedar Beach and the other Incline Beach. I was to inspect the paving of approach roads, parking bays, and footpaths, plus some minor grading and other construction details.

Erik Beyer took me over the projects. Teichert was the contractor, and I was introduced to the crewmen. Charles Schultz was superintendent; Don Westbrook, whom I already knew, was foreman on the grade; Ed Grey on the paving; and Jack Reynolds was owner-operator of the loader and float. I spent only two and a half hours on the job this date, but returned the next day for a full ten-hour shift.

The total Teichert crew consisted of the same superintendent and foremen named yesterday and five laborers, one water truck operator, and eight truck drivers. There were five ten-wheelers and three transfer trucks. One Galion six-ton tandem roller and a twelve-ton rubber-tired roller, a tractor with drag scraper was also available. This crew stayed about the same on these two jobs almost every day, except that the roller man was fired about May twenty-fifth, on account of unsatisfactory work. Trucks and equipment varied depending on what kind of operations were taking place at a given time.

I shall describe briefly the two parks. Burnt Cedar Beach was provided with a large swimming pool and a dressing room and several parking bays with adjoining roadways and footpaths and, of course, sanitary facilities. A small tollgate house was provided at the entrance. This was a beautiful setting for a beach park; native trees and shrubs were left in place as much as possible. The name "Burnt

Cedar” refers to the semicharred remnant of a burned incense cedar tree which has been left standing in its permanent setting without detracting at all from its living surroundings; rather, its presence makes a focal point of interest and for conversation.

The district secured a man by the name of Angelo Pecorilla of Douglas County to do some landscaping on Burnt Cedar. He planted lawns and shrubbery and installed an irrigation system. He was at work while Teichert was paving. I was not required to inspect the landscaping.

Incline Beach to the east is separated from Burnt Cedar by intervening lakeshore residences which were built many years ago. Both parks are served by what used to be the main state highway, but which now is called Lakeshore Boulevard. Incline Beach is not nearly as fancy as Burnt Cedar Beach, but sufficient parking bays were built, and eventually paved, to accommodate summer weekend crowds. A bath house, or a dressing room, and a sanitary facility were provided, but there is no heated swimming pool. A tollgate shelter was provided, however.

The area at Incline Beach is considerably greater than the area at Burnt Cedar. These two parks are for exclusive use of the Incline residents and their guests. The Incline people and their guests must present their identification cards to the gatekeepers.

A district pump house was being built at the west end of Burnt Cedar Beach. When completed this pump house would send Tahoe water to the water tanks which would supply the newer subdivisions, which we were inspecting at the present time. Erik Beyer did the inspection of the structures himself, that is, this pump house and its appurtenances; and he was present there for at least a short time every day until the work was finished.

My first full working day was May twentieth, The contractor’s crew was at work on Burnt Cedar doing finish grading on the parking bays and roads, and were placing an inch and a half size crushed gravel in drain channels along the southerly side of parking areas and along the low side of the entrance road. This required two truck and trailer loads.

I helped stake out footpaths in the afternoon. These were narrow, and grading had to be done mostly by hand labor. I accompanied Erik Beyer to Incline Beach and looked over the area which had been paved previously. Erik called attention to change the paving about the new beach house. On Friday, May twenty-first, Erik phoned me at six o’clock A.M. There would be no work due to four inches of snow at the Lake.

Work resumed Monday, May twenty-fourth, I assisted Don Westbrook in laying string lines for paving until about nine o’clock. Paving was supposed to start at nine, but the plant at Truckee broke down. The balance of the morning was spent by the crew grading footpaths and placing more rock drains. They cleaned several mud holes and backfilled with gravel to proper grade and then compacted it. Some paving was completed on Incline Beach in the afternoon.

May twenty-fifth and twenty-sixth were cold, cloudy days, but both were ten-hour days. Paving was done, but rather slowly on account of limited trucks. There were only six available Tuesday, and they all seemed to arrive at the same time. After they were all unloaded, there was a time interval of about one and a half hours before they arrived again. The crews were then kept busy in the interim on handwork grading footpaths and setting two-by-four side forms getting ready for paving footpaths.

Compacting of pavement was done as usual by a two-wheeler breakdown steel roller, then final compaction by rubber-tired rollers. However, there were some tight places adjacent to the curbing on the curves that had to be whacker-tamped or hand-tamped.

Both parks were available to Incline people while paving was in progress. This caused some problems with traffic—kids on bikes would ride over fresh asphalt before it was properly compacted, and cars would drive over asphalt surfaces freshly prepared and cleaned for application of seal coat screenings. They would spread mud and dust from their tires, and this required more brooming and some washing before spraying the sealing compound (otherwise the seal coat would not stick). Barricades were put up, but these were often disregarded, especially by the bike riders. Most of the paving of these two days was done on Incline Beach.

Thursday, May twenty-seventh was a very rainy day at Tahoe and some fell at Carson. As I recall, the rain turned to snow at the Lake and that shut the two beach jobs down 'til June third.

During the week's interim, I worked in my yard and on May thirtieth I did the usual thing for Decoration Day—played with the Reno Municipal Band at the Reno cemetery.

Back to work June third, with Teichert's crew on Incline Beach. Most of the day was spent paving and patching low places or bird baths, and places where heavy equipment left dents at intersections. The sidewalk paving was placed and rolled after three-thirty in the afternoon. The sidewalk mix was three-eighths-inch maximum size because the sidewalk thickness was only about half the pavement thickness and we could not use the larger-sized aggregate.

All road and paving bays were paved with a regular three quarters-inch maximum size mix, with the gradation conforming to the state Highway specifications. This finished the paving on Incline Beach; seal and chips would be placed later.

In the meantime Pat Canterbury was left with a helper at Burnt Cedar setting forms for some additional rock drains and doing wheelbarrow work, moving dirt to and from the sidewalks. The following day, the entire crew was busy on Burnt Cedar. They finished setting side forms at nine-fifteen, and were then busy with wheelbarrows transferring the first truckload of three-eighths-inch mix to the sidewalks. They leveled it by hand-raking and using a three-horsepower whacker to compact it. This whacker appeared to be ideal for the footpath compaction. The walkways were too narrow, and in some places, too steep to use conventional self-propelled rollers. The biggest problem was to keep kids with bikes off the project 'til the asphalt cooled.

There was only one truck this date and it took about two hours for it to make the round trip to the Truckee plant and back. While he was away, the crew would finish compacting the previous load and did more hand-grading on upper sidewalks. Temperature of the mix was sufficiently hot to work and compact well for even the last wheelbarrow load.

Foreman Don Westbrook predicted that the sidewalks would be finished Monday, June seventh. However, weather again interfered, and work did not resume 'til Wednesday, June ninth. This was good for me, although not good for the paving operation.

Our youngest daughter, Elaine Eidson, accompanied by her nine-year-old daughter,

Moss, were flying in from Alabama. I met them Saturday at five-twenty P.M. The following day, we drove to the south shore of Tahoe and had brunch at the Top of the Wheel at Harvey's, then visited the Glenn Amansons on the California side of the state line.

More visitors arrived Tuesday, June eighth—Arlene Graf Ellis and husband from southern California. Arlene was Ruth's roommate at Western State College in 1923 and 1924. All the womenfolk went to the Park house in Genoa for tea while we menfolk stayed home and I worked in my yard.

June ninth was the next working day in Incline, although it was cloudy and cool. Seal coat screens were applied to portions of finished pavement at Incline Beach, anyway. Liquid asphalt grade RC-800 (that's a heavy oil) was used for seal and was covered by spreading of three-eighths-inch screens. Narrow walkways and angles could not be sprayed with the heavy oil which required use of a power sprayer, so a light sealing oil, class SS-1, was placed by a hand spray in these hard-to-get-at places. The seal and the screenings could not be placed 'til the pavement was thoroughly broomed free of dust and debris, using a power broom. This usually was done around seven o'clock in the morning at both parks. However, in the afternoon when the crew moved to the Incline Beach, the paving was found badly dirtied by visitors, and their cars were parked in the area to be treated. They had done this in spite of the area being blocked off with traffic barriers.

June tenth and eleventh, work continued with seal and screens on both beaches. Traffic did not interfere as much as on previous dates. However, two cars got into one of the parking bays on Burnt Cedar and left their vehicles. The owners could not be found, and before the seal could be placed something had to be

done. So the crewmen had to literally pick up and carry these vehicles to a nearby area already sealed. The brakes of the cars were set, and of course, the doors were locked [laughs].

By quitting time June eleventh, seals and screens were finished on Burnt cedar and all paving except sidewalk between guardrail and pump house. In the afternoon I visited the upper golf course to investigate winter damage reported to have occurred on some of the paved golf car trails. This was done at the request of Mel Fodrin, who was recently hired by BoiseCascade to act as their inspector. Mel was a student of mine in math and science at Carson High School, 1924 to 1926, and had also just retired as chief draftsman for secondary roads in the state Highway Department. He decided he would get something extra to do because he had already done some private work and had part of his Social Security made, and he thought [if] he could get a few years more work, he would be able to make Social Security, and he managed to get on with BoiseCascade.

After noting the damage at the golf course, I visited Charles Court on Unit 1 and found where the State Prison wood cutting crew had damaged water service boxes on Lot One, Block D. Neither of these damages were caused by the contractors on the units I had inspected. Boise-Cascade will have to foot the bill for repairs on the golf course, and the district the bill for repairs to the water services.

It has been the custom of the State Prison to send a crew of trusties (supervised, of course) out into the woods where construction has taken place to cut down damaged trees and trees which were dead in the area. And they were cut up in lengths of about four feet and they were placed there for people who were looking for firewood. The wood is free. However, there are some areas where the local

residents are given preference. I managed to get some wood myself, but those four-foot pieces sometimes were too long to get in my car, so I had to pick up what I could find that would fit into my trunk. As a matter of fact, I think I managed to get about seven cords, and in 1976, I'm still using it.

Saturday, June twelfth, we drove daughter Elaine and granddaughter Moss around the north end of the Lake. I drove them up to Lot Number Nine on the westerly side of Allison Court on Unit 1-B. This is one of my favorite spots to view the Lake. That lot is in one of the highest areas among the Incline subdivisions. At this point, most of the Lake and surrounding timbered mountains are in view.

Sunday the thirteenth, we drove over Ebbetts Pass and down to the Remington cabin near the Bear Valley ski area. We had a family reunion there with all three daughters, two sons-in-law, and six of the nine grandchildren present. The two oldest daughters, Moss Pickering and Joan Remington, and their families live in Stockton. Elaine and her daughter would visit with them for a week before flying back to Alabama.

Sealing and chip operations were continued June fourteenth on the west end of Incline Beach, where some spots had angles and sharp curves in the pavement were missed. Brooming to clean such areas had been done earlier. Such work was done with a hand sprayer, rakes, and shovels.

Seal and screen work was finally completed on the Incline Beach at twelve-twenty. Operations were moved to Burnt Cedar Beach, where some hand-grading was still to be done on footpaths next to the guardrail; and the placing of seal and chips at sidewalks and road intersections. This was a nine-hour day.

On June fifteenth, Don Westbrook had arrived on the job at six-thirty in the morning and had the striping crew starting on Burnt Cedar's traffic stripes. Centerline stripes were painted on the roadway and the division stripes were placed in parking bays. Arrows and path crossings were also painted. The only striping left to do was on the unfinished walk below the guardrail and the parking area above the pump house and, of course, all of the striping of roads and parking bays on Incline Beach.

One small crew continued with paving of the last footpath on Burnt Cedar. I arrived an hour and a half late June sixteenth on account of car trouble. I found only five workmen present, including Superintendent Charlie Schultz and Foreman Don Westbrook, one operating engineer, one truck driver, and one laborer. However, they were all laboring whether they were superintendents or foremen or what they were. All of the other men had been sent to Carnelian Bay on another Teichert job.

The five crewmen left were using steel reinforcing bars to pin down the concrete traffic stops on the east side of the entrance to Burnt Cedar Beach. They were doing a fine job of it, but at eleven o'clock union pickets began their strike march at the gate. The five-man crew therefore left the job and headed for Carnelian Bay to join the ones who left yesterday. Apparently it was only the Nevada job that was affected by the strike. Carnelian Bay is on the California side, and workmen apparently are not affected over there.

This was a two and a half hour-day for me; however, I drove to the upper golf course to see how Mel Fodrin was making out. He had asked me to give him a hand if I could spare the time, as he had never had much experience inspecting paving. Since I had nothing else pressing, I stayed with Mel on

the Boise-Cascade paving job the balance of the day.

The union had begun the strike at eleven in the morning, but six loads of hot asphalt mix were on the job and it would have to be wasted if it could not be used within the next three hours. The union okayed using the loads.

I went along the golf cart trails with Fodrin while the six loads were being spread by a special paving rig. I pointed out to Mel the important items to watch on paving and compacting. This was a gratis service on my part, but I was glad to do it. There was no work during the rest of the week nor on the following Monday on account of the strike.

Tuesday A. M., June twenty-second, I drove to the beach areas and was told by the gatekeeper at Burnt Cedar that the strike was over and that work would probably resume shortly. I drove to the Boise-Cascade office, found Mel Fodrin, and visited with him for a short time, and then returned to Carson. This, of course, was not a workday for me.

I received a call from Erik Beyer early Wednesday morning. He wanted me to take over on Unit 4 this date. I arrived at the district office late, about nine o'clock, due to more car trouble. Erik gave me a set of plans.

Unit 4, Project 69-6, as it was called, is located between First and Second Creeks and adjoins three older subdivisions on the south——Woodridge, Ponderosa Four and Ponderosa Five. It has access to the Mount Rose highway via Tyner Way, which leads to the southeast and also joins Unit 2. Except for a small eastern section served by Tyner Way and Lariat Circle, it is quite compact.

The contractor was J. F. Shea Incorporated of Redding, California. Their local office and storage area was located on the extreme western edge of the project, at intersection of Len Way and Spencer.

Most of the utilities and the sewer and water mains and services were all placed in 1970. My principal job would be to see that fine finishing of grade, placement of base course, and placement of plant mix surface was done according to plans and specifications. At least that's what I thought the principal job would be, but as I explain later on, you will see there were a lot of other things in addition.

Bill Givens, one of the inspectors who had worked on the project in 1970, was still on the job and would be able to handle unfinished mains and services, and no doubt would assist in checking of raising of manholes, valves, fire hydrants, and utility boxes after paving was completed. The project manager was LeRoy DeMartin; his chief assistant was a younger man by the name of Roger Henry. Curt Jones was foreman on the task to which I was assigned. Howard Thompson was the grade setter.

Howard and I ran into some alignment puzzles and we had to contact the designer's surveyor—his name was Mattson. This did not happen just once, but several times. Between us, and with Erik's assistance and approval we managed to untangle some design goofs. Some of the other top hands were Johnson, the catskiner; Eugene Hill, another equipment operator; and one of the best blade men I have ever seen, John Robinson was his name. John and his brother Richard came on the job later in the summer; Richard was a loader operator. They both had been students in 1950 and 1953 in the one-room grade school at the Conference grounds near Zephyr Cove. Mrs. Little was their teacher at the time.

This June morning, the twenty-third, I left the district office with Erik Beyer and we met with the project manager LeRoy DeMartin, the superintendent, Roger Henry, and also Curt Jones, all representing the contractor;

and with Mel Fodrin representing Boise-Cascade; and with the other inspector, Bill Givens. We met on Lariat Circle. Principal topic was errors in survey which had caused much trouble in setting grade. The designer's surveyor, Mr. Mattson (whom I previously mentioned), had his work cut out for him, resurveying much of the grade to balance cut and fill sections which had caused quite a little trouble, the way they had been set up. This would have to be taken care of before base and pavement could be laid.

After lunch, I observed for a short time the area being cleaned up. The contractor had two trucks hauling boulders and debris to the designated waste area at Ophir. I had to leave the conference and go back to Burnt Cedar Beach, as the Teichert crew was at work again—the strike being over. Don Westbrook and crew had already finished the car stops in the parking bays, and they were placing a second lift of paving on sidewalk below the guardrail. They would finish paving sidewalk and driveways and complete the cleanup work this date. I returned at four o'clock to the meeting and discussed the problems with Fodrin, Beyer, and the contractor's men on Unit 4.

Bad wet spots had appeared at many places this spring after snow had melted. To all appearances last autumn, after the dry season, these were all dry areas and satisfactory. We did not finish this discussion until five-thirty P.M. Change orders would have to be prepared to arrange for proper drainage of wet areas to eliminate detrimental effects on pavements.

Copies of some of the change orders for a future historians s reference will be submitted for University files.* It must be remembered that all these change orders alter the original contractor provisions and must be paid for separately on a "time and material" basis plus a percentage (usually fifteen percent). The

work orders and change orders, after being agreed upon, must be signed by all parties involved; in this case Mel Fodrin signed for Boise-Cascade, Eugene Mattson as engineer for the planning work, Erik Beyer, district engineer, for Incline district and Roger Henry for Shea, the contractor.

On Thursday, June twenty-fourth, I put my car in the garage for repair and rented a Mercury, which I also used June twenty-fifth. I was an hour late getting to work on account of my car trouble.

Immediate problems on Unit 4 had to do with drainage of wet spots in many places on the grade. Most of these bad spots were next to the cutbanks and in the courts. LeRoy DeMartin had quite a supply of perforated metal drain pipes but was short of regular corrugated metal pipe. He asked me if he could substitute the perforated drain to carry the water across the dry part of the roadway to the fill slopes. He would do this by putting a perforated pipe upside down and then covering the drain holes with tar paper. I would not allow it, because the paper would surely move and displace, and would let future water seep out into the surrounding territory; thus wet places in the dry subgrade would endanger the paving. LeRoy decided he would order more regular corrugated metal pipe and wait 'til it came before doing any more on the job. In the meantime, backhoes were put to work excavating trenches in wet places and bringing in three-inch drain rock to place under and around the perforated metal pipe. Erik, Mel Fodrin, and I went over the entire job in detail and picked out numerous places which were potential trouble-makers because of poor drainage.

*See Little papers, UNR Library

The Gradeall, a specially designed grader pulled by a truck, which was used for shaping fill slopes was observed at work. This was a relatively new way to do the job which previously was done by laborers with rakes and shovels. And that is a very slow method. A man who lived in Washoe Valley owned and operated this machine, and he was doing an excellent job. I don't remember his name. The driver of the truck for this operation was one of the sons of Marie Russell, who was my chief of office girls in the Highway laboratory.

I met LeRoy De Martin just before noon, and looked over proposed work to be done with rock protection at concrete head walls and outlets of a large diameter multiplate metal drain pipes. This 1971 crew of the Shea company was new to the job; thus LeRoy had temporary guide signs placed at all intersections and courts to aid in finding the way for the workmen and other employees. The 1970 work was mostly laying of utility lines and rough grading and placing structures. all of this was done by a separate crew.

In the late afternoon, I again visited the Gradeall at work in another location. This time the machine was staking rock and boulders at the toe of the fill of Fallen Leaf Way. I marveled at the adaptability of this machine. Stacking rock to protect from erosion had always been a hand-labor operation. In the late afternoon I went back to Tyner to measure for setting slope easements, but found no stakes. Here was another job for the surveyor. Each of the following days through July second were very much alike. There were two principal operations: one, constructing drains in the numerous wet places and the subgrade, and two, slope trimming and cleanup. This drain work could not have been done last year prior to placing sewer, water, gas, and electrical utilities on the grade. The wet places did not

show up until the big snow melt occurred in the late spring of 1971. Intercepting of utility lines placed last year, particularly water, gas, power, and telephone occurred often. There were many breaks in these lines by backhoes excavating across these utilities. And this was done unavoidably; regardless of all the care that could be taken, there were breads made— in fact a good many of them.

All the wet places had to have coarse drain rock, then perforated drain pipe, which would connect with solid-wall pipe to carry water over the dry subgrade to the edge of the fill slopes. The trenches thus excavated had to be backfilled with decomposed granite and compacted to specifications. Two technicians, Guy Oliver and Charlie Swift, stayed on the job checking density. They were representing the Sharp and Krater firm in Reno. As many as sixteen tests were made on some days.

A typical list of personnel and equipment doing this work would read as follows: one superintendent or manager, one assistant superintendent, one foreman, four laborers, four truck drivers, and seven operating engineers. Equipment would consist of two Case backhoes, one Gradeall, three blades, one water truck, one carryall, and three ten-wheeler trucks. Each of our daily diaries carry a list of the personnel and the equipment. (If you work two hundred days you would have two hundred such lists, but I'm just giving one typical list here and on the copies of diaries which I turn in for the files, the list of personnel and the equipment can be found there as well as something about weather; but we ordinarily do not go into the weather part of it very much, except when it rains so badly that you have to put on the rubber clothing, or it snows so badly that you have to quit work. But if the day is extra hot, we may mention that, or is extra cold it may be mentioned. And then there are following these things,

there usually are from one to five pages of longhand describing the day's work. I try to boil it down as much as I can, but sometimes it gets a little involved.)*

The Shea company emphasize safety, and about three quarters of an hour was spent approximately every two weeks in a safety session with all hands present. This was done in the early morning before work.

Before base course laying could start, this matter of drainage had to be well along, as the base could be laid and compacted rapidly once that process was started. The base aggregate on this project was obtained from a porous volcanic rock deposit above the south bank of the Truckee River—a few miles below Truckee and near Hirschdale. The name of such rock is *scoria* and in this case, it was mostly red in color. Tests of the aggregate were satisfactory, but quite a few tests were made during the base production.

The Gradeall with its two-man crew and a cleanup crew were kept busy also, but emphasis was placed on getting all wet spots drained and subgrade refinished and ready for base course. During this period, Foreman Jones and I found still more wet areas. These were particularly bad in some courts and on Tyner Street. This meant more work orders would have to be prepared.

Apparently for ecological reasons, the contractors were not allowed to secure local backfill soil required for filling extra trenches and for bringing fills up to grade on the roadways and on the courts. Normally, cut and fill materials are made to balance but this can't always be done. Sometimes there is too much cut to make the fill and material has to be wasted: other times there is not enough cut material to make the fill properly, and the material has to be borrowed. The ecologists were pretty insistent about moving extra material—cutting it here and

there along the highway. It had to come from designated areas. Actually, a lot of it had to be hauled about twenty miles from Clear Creek deposit at the east foot of Clear Creek grade. In earlier times, contractors were allowed to dig into banks almost anywhere for extra dirt, regardless of appearances of the landscape. But times have changed. John Savage of Carson City was hired to haul decomposed granite from the Clear Creek grade for these dirt shortages. The drain rock was hauled principally from Truckee.

I was told early in the morning July second by Thompson, the grade setter, that he found two drop inlets on lower Saddlehorn which had been set too low. These would have to be raised to coincide with the finished grade. This makes quite a chore to raise these concrete appliances, and place more concrete underneath them in doing so. In examining this area I found more wet places needing more drainage. I also found the bottom box for water services on Lots 29 and 30 had been broken.

The long Fourth of July weekend including the third, fourth, and fifth meant that I would have some more band work to do. I had already played with the Reno Municipal Band Saturday, June second, in the Rodeo Parade. July fourth, we played two concerts—one was for the Republican meet in the afternoon at Idlewild, and the second was at the University of Nevada athletic field for the fireworks celebration.

Monday evening July fifth, was band practice and Wednesday evening, the band played a regularly scheduled concert at Virginia Lake. We played again Saturday evening, July tenth, for the "Tombola" affair

*See Little papers, UNR Library

in a little park near Washoe General Hospital. The band work would continue all sunnier with Monday night's practice and Wednesday night's regular concert. I told Tinkham I would be too busy in August to play with them, but I would play through the months of July and September.

July sixth to ninth was spent checking compaction of all trenches used for drainage structures which were recently put in to dry up wet areas caused by spring runoff. Also, the testing of water and sewer lines for leaks and obstructions required reexcavating. This kind of testing was done by a special crew of the contractor, under the inspector's supervision; Bill Givens was the inspector doing this. These new trenches, of course, had to be backfilled and compacted and tests made to determine the actual density.

Grade setters were very busy with final stakeouts for finished subgrade. They were followed closely by Robinson, the chief blade man, who always took pride in his work and did an excellent job. The courts gave the most trouble, as low and high places had to be ironed out and well compacted, and grade had to be maintained to drain the water in certain directions. Before placing the base course, of course, all of this drainage work and checking of low spots and checking of grades had to be completed and well compacted. The vibratory roller was used to secure final compaction in these areas and its operator worked closely with Robinson, the blade man.

Guy Oliver and Charlie Swift, the two compaction technicians from Sharp and Krater, were kept busy checking compaction over refilled trenches and rebladed and rerolled subgrade. The contractor's superintendents and foremen were careful to see that the water truck was always available, so the compaction could always be done properly with near optimum water content. The trench

compaction tests came out almost always in the upper ninety percentiles.

Mel Fodrin made frequent trips to the job, as he represented the owner, Boise-Cascade. He conferred with Roger Henry and me many times regarding minor changes and helped prepare change orders for the major changes, such as extending Len Way to Spencer Way and adding a fifteen-inch corrugated metal pipe. During this week the contractor was about ready for base and surface on Unit 5, which was located east of Unit 1-A and north of Unit 3, and adjoined the Mount Rose highway to the south. Erik Beyer asked me if I could find another qualified inspector. I told him I would contact Victor Clyde, who had recently retired as chief maintenance engineer and who had been chief construction engineer and had been a resident engineer on many projects over the years with the state Highway Department. I explained to Vic what the job was like and he was willing to take it. Erik asked me to notify Vic to report at eight o'clock, Monday, July twelfth. Vic, like Mel Fodrin, was a former high school student of mine; he was always a top "A" student in math. I don't recall that he *ever* missed getting the right answer to a problem.

Word was given at the end of this week that base course could be started on parts of the project that had all pipeline testing, compaction, and trenches, and subgrade satisfactory; and also the fine finishing of subgrade was absolutely complete. This probably was as much as two miles of areas ready for base. Monday, July twelfth, came and went without base, and so did Tuesday, July thirteenth. Trucks could not be released from another job 'til Monday, July nineteenth. This latter date was set tentatively for starting the base course.

On Monday, I traveled over the entire project, looking for needed cleanup and found

dirt, boulders, and debris piles in a number of places. The question was, who made them? Some of these piles may be blamed on the timber and brush clearing operations. Regardless of who made them Shea will be required to do the cleanup. Some of the dirt piles off Tyner fill slopes and on Valley Court presented problems. However, the Gradeall was fitted with an extension and it was thus able to reach all the way down the fill slope and pick up the unsightly piles—what a marvelous machine!

One of the three blades was taken off the job because it was unable to continue until all the open trenches in its assigned area had been filled and compacted. The sewer and water line trenches had been reopened where leaks were found on testing. At this time of year, the warm weather had caused most of the minor wet places to dry up; such areas were checked for density and okayed to receive base.

A very fine large Jeffrey pine located at [the] edge of the roadway on the westerly end of Tyner caused some comment regarding width of the road. Everyone agreed, finally, that the tree should not be removed, although it did make the travelway about a foot narrow at that point. We decided that it was better to save it, as this particular road would carry very little traffic volume; thus the safety factor would not be critical.

Compacting all questionable places within the area where the first base would be laid was paramount; thus Guy Oliver and Charlie Swift were really put to work on the thirteenth. All but a few of their tests were very good on the initial sampling. Lower Tyner and some connecting lanes were now ready for the base course.

Bill Hart, owner of the Sha-Neva red cinder deposit near Hirschdale, bought samples for examination, and brought along

some test reports. And he asked me to visit the deposit, also check operations of the crushing and screening plant. This I promised to do before the week was over.

Hart's samples of crusher-run materials were sieved dry, thus showing only two percent passing the Number 200 sieve. By using the washing method of sieve analysis, which is according to the standard test method, the minus 200 increased to four percent, which was more nearly accurate.

My car brakes went bad and I had to take it [to] Howard's Standard Station at Kings Beach. In the meantime, I had borrowed Erik Beyer's car to get home. I came back with it the following morning and Erik drove me to the job. With transportation help from Bill Givens and the contractor's foreman and superintendent, I managed to go where needed on the job. My car was fixed by four-thirty P.M. I believe it was Thompson who drove me over to the garage; thus I finished the shift, which ended at five-thirty with my own car.

Thursday and Friday the fourteenth and fifteenth were spent in making checking of widths and cross slopes of the roadways and courts, which were about ready for base course. I found several concrete inlets were too high or too low to match the finished manteling surfacing. The carpenter who set the forms said he did so according to elevations shown on the plans; this meant that there would have to be adjustments made in base and surface thickness to match the inlet elevations. I made notes accordingly, so that these adjustments would be made at the proper time. Other narrow places on roads leading from courts to main roads were again found. However, where these occurred in thickets of fir or where specimen pines occurred, the narrow places were not widened unless the widths were too narrow

by as much as eighteen inches or more. It was considered important to save as many of the trees as possible adjacent to these very low traffic roads.

Bill Hart appeared again on the fifteenth with another sample of his red scoriaceous base aggregate. This sample was for plotting the moisture compaction curves to determine the optimum amount of moisture to obtain a ninety-five percent minimum weight per cubic foot to compact a base.

On the sixteenth, I contacted Guy Oliver, tester, who reported the following areas satisfactory for compaction of subgrade and trenches: Lariat Circle, all of Tyner except sewer line on westerly end and trench where broken main was repaired, all of Valley Road as far as Len Way, all of Saddlehorn, all of intersecting courts off Saddlehorn Circle, Doeskin Court, Rock Rose Court, and Woodridge Way. Repairs were to be made tomorrow on Tyner. I found more trouble on Tyner; some wide places on the street had been staked for only thirty-six feet of base course where forty-four feet was required. This was a stakeout mistake, as the finished subgrade was plenty wide enough to get the forty-four feet. I saw to it that the stakeout was changed.

At ten-thirty A.M. I checked pipe lengths needed to carry water away from wet areas. I did not agree with the lengths shown on change orders. More than a hundred and thirty feet would be required along Len Way and much more than thirty feet across the ell at Spencer intersection. I certainly will be glad when all these wet places are piped away, backfilled and compacted—this was my thinking according to my diary. I checked the need for more pipe with District Engineer Beyer, and he agreed and suggested that I check all future change orders even if he had a part in making them.

Fallen Leaf Court was rocky, and Robinson, the blade man, had to call on a loader and carryall to clean up the rock and boulders he loosened with the blade. Pipe being laid in the areas described in change orders was increased from a hundred and thirty feet to a hundred and sixty-six feet along Len Way and the pipe across the ell at Spencer required fifty-six feet instead of thirty feet. Change orders were modified accordingly. All pipe was laid, backfilled, whacked, and compacted this date, that is, the pipe which I have just described.

All these spring runoff wet areas caused several thousands of dollars of extra work; as an example, the extra work material on Lariat drain alone, included the following: a hundred and forty feet of perforated metal pipe, a hundred feet of corrugated metal pipe (all six-inch diameter), 91.3 tons of drain rock, thirteen hours of truck time—there are no records in my notes on labor and operators' time. My estimated cost on this one project is approximately twenty-five hundred dollars—I do not have exact figures. I was told gravel base would be started on Monday.

On Monday the nineteenth, I arrived on the job before seven o'clock and checked with Superintendent DeMartin about hauling and placing of gravel base. The first loads would be placed on the upper part of Lariat Circle in windrows. Windrowing would be continued as long as gravel would be hauled.

Spreading and compacting over the planned widths would be done later, and after taking depth measurements of the compacted base, further adjustments would be made by blading and removing excess thickness, or if thickness is too shallow, more gravel would be added and recompacted. I carried my grubbing hoe in the Dodge to dig depth check holes; I lost that grubbing hoe later, which I will explain.

The first six loads delivered were sampled by Guy Oliver and me. This large sample was mixed and quartered down to about fifty-pound size to submit to Sharp and Krater testing lab. Another approximately fifty pounds would be used by Guy to plot moisture density curves to determine correct water content, to obtain the required compaction. I specified the following tests be made on samples submitted to Sharp and Krater lab: sieve analysis, specific gravity, sand equivalent, rattler tests (that's an abrasion test), Atterberg limits. On the job all blades and a loader were busy preparing other areas for placement of the base course.

On Saturday, the seventeenth, quite a number of the supposedly finished areas, which had the trouble repaired, showed still more leaks. Thus the repair crew were again busy Monday, digging up water lines, making more repairs and backfilling and recompacting.

The remaining four working days this week was spent on the principal item, base gravel. However, the repairs and cleanup of fine grading of subgrade, slope trimming and other miscellaneous jobs were continued.

On Wednesday the twenty-first, at eight A.M., I called John Stark, chief of the lab for Sharp and Krater. I wanted to find out about the test results on the gravel base sample submitted on the nineteenth. Stark said the results were not quite complete but to call about nine-thirty and he would have the results at that time. I called again and found grading to be inside specification limits, except for a minor amount of oversize. The sand equivalent and other tests were very good.

In the late afternoon on the twenty-first, Robinson was put on the Lariat and spread windrowed base gravel. Water was kept on the gravel while blading. The results looked

good; segregation was minimal. (Report Number Twenty submitted as example of this work.* It can be placed in the library files at the University.)

Soon after my arrival on the job July twenty-second, Roger Henry and I measured the recently completed rock-lined vee ditch—Station 24 + 76 on Tumbleweed down to Station 3 + 30 on Fallen Leaf. Our measurement showed 220 feet in length, for this six-foot-wide ditch was exactly what was shown on the plans. You see, every once in a while, we come out right on the nose.

Met Erik Beyer at eleven o'clock, and we looked over the proposed drain off Fallen Leaf Court. Erik recommended that a vee ditch there—but its dimensions and route should be checked sufficiently to avoid damaging trees. Six base depth checks were made on the bladed and spread material, but not yet compacted. Depths were such that they indicated excessive material, but after watering and rolling this can be verified. Widths of base spread were slightly on the low side, but compacting will widen it to about the required width. The vibratory roller was on the base and compaction values were determined by both nuclear and sand cone methods. They were found to be respectively ninety-five percent and ninety-six percent; ninety-five percent or above meets specifications.

On July twenty-third, the windrowed gravel in several courts was flattened and spread by blade. By noon, courts Doeskin and Rock Rose were finished. As far as blading was concerned, two additional courts, Bronco and Matchless, received gravel and windrows. There was also some blading done there, and they were watered. The vibratory roller

*See Little papers, UNR Library

was put to work, but broke down before compaction could be finished.

Erik and I left the job at three o'clock to visit the gravel production at the Sha-Neva deposit near Hirschdale. We met Mr. Shane, the owner, and were allowed to go over the deposit and to observe plant operations. This deposit of scoriaceous lava is a volcanic cone, in which the harder, less scoriated, lava is black in color and more or less forms the central core and is quite loose and can be worked without blasting or scarifying. Peripheral areas are red in color, with some variations from orange-red to dark maroon. The red-colored areas are more scoriated and a little less dense than the black core material.

The crushing and screening plant was being fed with a dozer without necessity of using a ripper. Plant operation is quite simple: fines from the feed belt go immediately to the stockpile belt; coarse material three inches and over is scalped out and with other coarse material from three inches to down to one inch, is run through rolls. The finer material is screened out onto the delivery belt, and at the same time, there is a partial return to the rollers of the particles which are still too large to go into stockpile of finished material. Segregation is lessened by use of a paddle-wheel arrangement at the end of the belt to the stockpile. The weight of the material pouring from the belt onto the paddle wheel operates it, which scatters, thus mixing the various sizes rather than letting them segregate. The resulting stockpile is thus quite uniform with respect to gradation. A loader operator moves that material which drops from the plant which I just described from a paddle wheel to a separate stockpile from which the trucks are loaded. The scalehouse, where loads are weighed, was being operated by Mrs. Shane at the time we were there.

We returned to the job site at five P.M. I made one more run over parts of the job to observe the cleanup, widening operations, and trench filling and compaction. (This will explain to future researchers just how this operation functions to produce a good degree of uniformity on gradation.) Shane and some of his top men have thus shown a remarkable degree of ingenuity in the design of this plant.

Friday evening, John Isbell called and invited Ruth and me to their home for dinner Saturday evening. We arrived at the Isbell home near Glenbrook at five o'clock, and Mrs. Isbell served a delicious dinner. John asked if I would have time to do the sampling of the gravel deposit above Wadsworth. He had finally made the deal with the Indian Service and with the Indian people at Pyramid, and he had equipment on the site, doing the prospecting. I told him I would have to do that—if I did it all—on a weekend and that probably could do it the following weekend.

On Sunday evening, the Fodrins invited Ruth and me to dinner at Pucci's restaurant out on U.S. 50, and we enjoyed that evening. Mel figured he owed me something for helping him out on his paving project, but I told him he didn't owe me anything.

Monday, July twenty-sixth, I arrived on the job to find pickets from the Reno chapter of the labor union. It was claimed that the contractor had exceeded the allowable percentage of labor from other sources. One blade man however, had arrived prior to the pickets. He in theory, at least, did not see nor have firsthand knowledge that the pickets were present; therefore, he remained on the job all day. Fortunately, he did, because he could then assist in dumping base course trucks, and he used his blade to break down the windrows. This was the only work done that date. The truckers stayed on all day with

the blade men. I checked the blading of two courts and left the job after three hours.

I reported at four o'clock to the local medical office for a physical examination. This examination is required for all car or truck drivers on construction jobs who are over sixty-five years of age. I attended the Reno Municipal Band practice Monday evening.

Tuesday, I waited at home 'til I could get the contractor's office on the phone; I did not succeed 'til about seven o'clock. I was told that the strike was over and workmen were on the job. I arrived at the job site about seven-forty-five. I spent most of the day inspecting trenching and laying of drain pipe in several places, and the welding of tees at drain outlets. This is done to split the outflow of water and slow down its flow as an erosion protection measure.

Base gravel was being hauled from Shane's Sha-Neva deposits and placed on Saddlehorn, Poco, Matchless and Bronco courts, using sixteen trucks. Blades were spreading the windrowed material, but I had no time to make preliminary checks of the thicknesses. I had to be with the grade setter to help reestablish dimensions and radii on Loma Court and to follow up on the grading and compaction and cleanup operations on Chiquita and Chico courts.

I also made out report sheets covering pay items on extra work required to present proper drainage on Lariat, Antler, Ophir, Tyner, and the drain there at Station 185. My records show that these four extra work jobs required 678 lineal feet of six-inch perforated metal pipe, 430 tons of drain rock and forty-six hours of truck operations. Unit prices for these items apparently included the labor and the operator's and truck driver's time. I have no record of the actual cost of these four extra work jobs, but I estimated it was about five thousand dollars. I cite this as one more

example of extra costs and extra time required to complete the contract. The contractor's always working against a deadline, as he is given a definite number of working days to finish his job. Daily penalties are assessed for each day over this estimated figure. However, he is always entitled to credit time spent on these extra work orders and change orders.

July twenty-eighth started with an extra warm morning and it was really hot for the Tahoe area in the afternoon. A roller operator was out for the day so Superintendent LeRoy DeMartin took over the roller man's job. These job superintendents and foremen very often get in with the crew and work as hard as any of them. They sometimes take over the repair jobs when water or sewer lines are severed.

Severed gas, power, and telephone lines are always repaired by the utility employees. Gas mains are usually made of gray plastic pipe and when severed, the contractor's men bend the ends back and plug them to prevent undue loss of gas. It sometimes takes a half hour or so for the company's repair crew to arrive on the scene; thus a lot of gas could be wasted if the breaks were not immediately plugged by the contractor's men.

Referring again to the bosses, almost always all of them have come up the line the hard way through all, or at least many, of the labor and equipment-operating jobs. This background of experience gives them complete understanding of problems and methods to solve them. This attitude toward personnel and toward personal hard work of these bosses develops a sense of camaraderie with their crewmen; thus the general input of labor and equipment operations is increased to the advantage of the contractor.

Base course gravel operations continued July twentyeighth, with all fourteen trucks hauling for a full ten-hour shift. I made another visit to the gravel plant at the

cinder deposit, this time accompanied by Guy Oliver. We took belt samples of the gravel and made a composite sample by combining and quartering down to about fifty pounds. This sample was sent to the Reno lab of Sharp and Krater. I asked for sieve analysis only, as the qualitative tests were unquestionably satisfactory. The next two days, July twenty-ninth and thirtieth, were spent by continued hauling, spreading, and compacting base gravel using the water truck to keep proper moisture-content for satisfactory compaction. This reddish-colored gravel must have appeared as red ribbons on the roadways, and blobs on the courts when viewed from the numerous airplanes flying overhead.

Width and depth checks were now being made on compacted base course and adjustments made where shortages or overages were significant. In case a thickness of six inches of compacted base is specified, allowable variations from about five and a half to six and a half can be expected. Statistics might be considered here, although it might be a little Greek to some of the people, but statistically considered, the sigma—that is, the standard deviation—can be plus and minus ten to fifteen, expressed as a percentage, for any specified depth without materially affecting the load-bearing capacity of the compacted base course. Excess thickness is, of course, better from a structural standpoint than is a deficiency. However, a marked excess should be removed and placed elsewhere when the pavements are made by the ton or by the cubic yard.

I had arranged by telephone to do the sampling for John Isbell Saturday and Sunday, July thirty-first and August first. Accordingly, I arrived at Wadsworth about seven-thirty, where I met John. We drove to the deposit

area and I began sampling and logging the test pits.

John had hired heavy equipment to excavate the test holes. Some holes required use of a ladder, but most of them had been sloped on one end to allow easy access. Better than half of the test pits were sampled Saturday; the others were finished Sunday. Altogether there were twenty-four test pits, varying in depth from ten to fifteen feet. Only eighteen of the pits were sampled, because of similarity or sometimes because the pit was dug outside the gravel area. The logs of test holes showed various layers, such as top soil, sand layers, coarse gravel, and fine gravel. On the whole, the material shown by the test pits showed good quality—approximately three hundred acres of the five hundred-acre area was shown to contain good gravel. I made recommendations as to the kind and number of tests to be made. This deposit could be used for concrete, for base, and for surfacing aggregates. John was pleased with the findings, and he would have the geologists with special seismic equipment work for him to determine depth greater than could be reached with a backhoe.

This was done later in the year, and indications were good. Gravel was at least eighteen feet deep over approximately three hundred acres. John also put down a well at the site established for installing a gravel plant. He obtained water of excellent quality and capable of furnishing ample quantity.

John and his partner, the APCO firm of Texas, established a gravel-producing plant and were in operation before the end of the year. Because of the great distance from the Reno area, the volume of production was not extra good. But the plant is still in operation, and at the present time (1976), John is trying to get complete control. I look for great things to happen here for John, but it will not be of

any great volume until the Truckee Meadow area is zoned out completely for gravel production.

While I was working on John Isbell's project Sunday, a skeleton crew was busy up on Unit 4 with the subgrade on Fallen Leaf Way, and they were brushing and trimming by blade, with watering and rolling. Trucks were already delivering gravel Monday morning when I arrived at seven o'clock. Earlier tests had shown subgrade in acceptable condition for compaction, but rerolling was done after trimming.

While Fallen Leaf was being graveled, preliminary brooming and preliminary watering and rolling was being done on what was called Loma Court. I remember these courts; they were always little roads (usually narrow roads) leading from the court out to the main roads. This particular project was all in one great big bunch, except out near the east end where Lariat Circle sort of feathered off by itself.

By three o'clock, Fallen Leaf was filled, and base course was dumped in windrows on Loma and on lower Tyner. Seventeen trucks of assorted sizes and doubles were hauling base this date. The weights, of course (trucks' weights), were kept by me so that pay quantities could be taken care of. I usually turned these pay quantities in at the evening or if the office was closed at the time I was through, I had to wait and turn them in the next morning. I kept the gravel base off some intersections, such as the one adjoining Len and Spencer, because further adjustments had to be made in grade.

I had made a trip in the morning to the Incline office and delivered my report for Friday. I did not find Erik, but saw Vic Clyde for the first time since he came on Unit 5. He said they were making pretty good progress

since he had been there. Of course, Vic had only the finishing of the grade and the base and the paving. (All the pipelines were put in the year before.)

LeRoy DeMartin had given notification he would start the plant mix surfacing at someday next week. I met with Erik and suggested we check Shea's surfacing gravel production at the Highland pit. Erik agreed. So I found Guy Oliver, and we drove to the Shea operation at Highland, and secured samples of the gravel and also sand aggregates from the separate bins and obtained the contractors' recommended proportions from these bins. The samples we took were then put together in these proportions for a complete mix. Forty- to fifty-pound samples from each bin and a fifty-pound composite were sacked, and Oliver would deliver them to the Reno lab of Sharp and Krater for immediate testing. Test would include the sieve analyses and preparation of the lab mixes with asphalt for stabilometer and other tests. We thus hoped to have all required tests done before paving would begin.

In late afternoon, Loma and some of Valley had base gravel placed in the windrows, but no spreading or compaction yet. One crew was at work cleaning and blading and watering and recompacting subgrade on Len Way, Lantern Court, and Boot Hill Court, and getting ready for the base.

On Tuesday, August third, Guy Oliver obtained density values, and he checked on three areas which had been recompacted. They were all satisfactory. This was a ten-hour day and twentyone trucks were hauling base gravel and dumping it in windrows in the various areas. They really kept the blades busy trying to level it off, and there was no way of telling exactly whether the compacted base would be anywhere near the correct thickness, until a day or so later.

Some subgrade work was done on Len Way and Spencer to adjust the grade so that the subgrade drainage would run away from any adjacent residence. There were a few residences already built on this project, particularly in the Woodridge subdivision just south of this project.

Most of the day's base gravel was dumped in the prepared areas on Tyner (Tyner was the long, main street). After placing what was necessary on the three areas, which had satisfactory density, only one blade was present; thus none of the windrows of base were completely leveled. The blade was busy on subgrade part of the time on Tyner from Station 140 to the intersection with Valley. Then another blade was ordered for Wednesday. An extra blade put on Wednesday enabled leveling of base windrows to be done in cul-de-sacs, that is, the courts, on the lower part of Saddlehorn and other areas nearby.

The blade on subgrade Tuesday was busy all day spreading and leveling base on Poco and on upper Saddlehorn. I dug probably as many as one hundred test holes in partly compacted base, to check on thickness on Poco Court and on upper Saddlehorn. Roger Henry assisted me later during the same day, on Matchless and Bronco. We found the base depth too shallow in just about every place checked. At least twenty loads of additional base were hauled to these places, but final checks will not be made for thickness until more rolling has been done. A flat-wheel, steel roller and a rubber-tired roller will be used to help finish the base roiling, which thus far has been by the vibratory roller, which has a tendency to fracture sewer lines underneath. So it has been pulled off. The vibratory roller is very heavy and really if there's a pebble down there on top of the sewer pipe, even though it's three feet down, and gets plenty of vibrating, it might

be pushed right through the pipe. I don't have records, but I believe there were several repairs necessary after this big vibratory roller had been on the base.

There were still seventeen trucks on today, plus the usual water truck. Of course the water truck had to keep the water on because to get correct compaction, you have to keep that water very near the optimum amount.

Thursday, the fifth, started off with twenty trucks. They were mixed doubles and singles and belly-dumps. There were two water trucks put on. The main idea was to get as much base on as possible before paving would start.

I asked Roger Henry to increase thickness sufficiently to meet specification requirements on upper Saddlehorn and the adjacent courts, which we had found too shallow. This was done with about twenty extra truckloads. Guy Oliver and a laborer helped me check base depths after rolling was completed on areas A and B and Chico, Chiquita, Bronco, and Matchless courts. (These names of the courts are interesting; I don't know who chose them, but it must have been a Spaniard cowboy, the way things look [laughs].) At least a hundred depth checks were made, and we found more shortages.

A conference was held in mid-afternoon with LeRoy and with Dick Rowan, regarding changing widths of asphalt shoulder dikes. (Rowan was a boss up from the headquarters of Shea at Redding.) The width of shoulders and dikes had to be just right; there was always a five-foot skip when paving was done. We put down the main roads with three pads: the first one's eleven-foot, the next two were tens, and that left five feet unpaved; and this five-foot strip, all the way through these big roads, would have to be done by a special paving instrument—one which would also pave the five-foot strip and form a dike to carry the water.

Dikes have to be put in very often on these roads because they're steep. They're not like the grades on state highways, which are limited to small amount. Some of those grades are ten, eleven, and twelve percent, and when that big batch of snow melts, the water comes tearing down through there, and there must be at least a five-inch dike to catch that water and carry it over to a drop inlet, rather than letting it tear out the bank.

I think I've already stated that we made a change in the shape of the base, and together with the dikes. The dikes had to be five inches high, but we found when we first started to put them together in other places that the base of the dikes should be about twelve—at least twelve inches. An eight-inch base was not enough—they wouldn't hold together. The contractors offered to make an extra width of base at no extra cost per linear foot. He realized he probably saved money by doing so, because so many of the narrow dikes had to be redone; they have tendency to collapse. So in the long run, he would be making money—rather saving money—by putting in more asphalt. I told him to go ahead. I thought the change advisable, but I would get the confirmation from District Engineer Erik Beyer, which I did.

I found the contractor did plan to start paving the following week, but I told him I could not give approval until all items in the designated starting area are satisfactory; those items being ample thickness of compacted base, passable density tests, cleanup of roadway edges, and passable retests of sewer lines. You see, the sewer lines are supposed to be tested at the time they are built, and sometimes they are, but often leaks are found after heavy equipment had been going over the top, even though they're down three feet deep, and sometimes retests for leaks have to be done. This job to be finished as planned

would require more equipment and more men. Work this particular date continued 'til five-forty-five P.M.

Friday, August sixth, the twenty gravel trucks, two water trucks, and three blades, one loader, and one rubber-tired roller put in a ten-hour shift. Guy Oliver obtained three very good compaction tests of base on Chico Court and on Chiquita Court. A low test of ninety-one percent was obtained on Bronco Court and order was given to rewater and reroll. Oliver, the tester, and I had made as many as a hundred and fifty depth checks on compacted base and showed a contractor's man areas which required more gravel. These were marked with paint—strips or paint checks—here and there. Watering was done very well this date, and base was going down very well, and compaction with the rubber-tired rollers were fair to good.

Oliver obtained three passing and one slightly low test for compaction on one of the south legs, I think it was, of Saddlehorn and also on Pico. Upon my recommendation, prime will be liquid asphalt, MC-70. (I don't know whether I should take the time to explain all that because it gets complicated. MC means "medium curing"—that is, the asphalt takes a medium amount of time to harden up. SC would be "*slow* curing," and RC would be "*rapid* curing." I found from state Highway experience in the climate of Nevada the medium curing was probably the best; the slow curing was still too soft when you're ready to pave; and the rapid curing sometimes would core up so fast that it really wouldn't do the job it was supposed to.) I also recommended from two-tenths to three-tenths gallons per square yard.

By three-thirty in the afternoon, Chiquita and Matchless and part of Saddlehorn was okay for priming Monday. Asphalt for paving will be a 120-150 grade. Now, a little explanation

on that: the asphalt used for paving is called the *hard* or *semihard* asphalt when it's at room temperature, or rather at regular, standard temperature, and it always must be heated with the aggregate in order to get the aggregate properly coated. Now this number, 120-150, gives an idea of the consistency of the asphalt at 70° Fahrenheit. There's a standard needle put on what is called a *penetrometer*. This needle has certain dimensions, and it is allowed—if the asphalt is in water at 70° and the needle is put down just there in contact with it, and then it is allowed to penetrate for five seconds with a hundred-gram weight on it, and the number of millimeters that it penetrates gives an idea as to the consistency of the asphalt. Now the old-time asphalts—we used what was called 50-60 grade—those were harder than brickbats after they cured. In fact they were so hard, they oxidized quite rapidly and the pavement would not hold up for very many years. Now 120-150 grade—that's a fairly soft asphalt, and it's good to use when it's fairly soft in the mountainous regions where the temperatures are severe. The old high penetration grades—rather the hard asphalts—have a tendency to crack in real cold weather, and these softer grades are not as susceptible.

I stayed on the job 'til six-thirty P.M., and observed Robinson with the blade and made sure that the water truck gave him ample water to do the fine finishing of subgrade, which had already been accepted for compaction; that is, we were doing subgrade, compacting that and getting it ready for base, and at the same time we were getting the base ready for paving. Before you get paving on, the prime coat has to go on. So there were a lot of things going on here at one time.

Saturday, August seventh, was spent by Robinson on the blade, and one water truck and one rubber-tired roller along with LeRoy DeMartin, Roger, and Guy Oliver and me. We

were the only people there—the bosses ran the machinery and also did some work with a Number 2 shovel, and there was a grade setter there—Thompson. There were no trucks and no regular operators and laborers today. Roger Henry operated the loader and would deliver base from stockpile on the job to fill the low places. LeRoy, Guy Oliver, and I were continuously checking base for depth and for soft places in the grade. A few soft places were found and were marked for treatment next week. Blademan Robinson, LeRoy, Roger, and I stayed on 'til dark. This was an eleven-hour day, all overtime.

Monday, the ninth, the prime coat on finished base areas was to go on in the afternoon; thus, there were twenty-two trucks hauling gravel, but only one water truck, as the other had a breakdown. There was a great scramble to get ready for the paving. Roger Henry had the water truck wet base around dry areas adjacent to drop inlets, and the laborer with whacker was put to work compacting the moist base. That is, they used the small whacker rather than the roller because the whacker jumps around—and jump, jump, jump—and packs things down in tight areas, such as right around concrete or in sharp angles where you cannot get the roller. Guy Oliver continued compaction tests on Saddlehorn and got all passing values.

The following roadways and courts were found to be ready for sealing: Chiquita Court, Chico Court, Bronco Court, Matchless Court, Poco Court, Parcel A, Parcel B, and all of Saddlehorn Circle between Station 3 + 38 and 38 + 49.48, except for a ninety-foot area, which should have been widened. This area was between Station 4 + 80 and 5 + 70; however, it was not widened when it should have been, so that work would have to be done and the subgrade rebuilt and base put

down over the entire section. This ninety-foot section, of course, was overlooked by everyone, including me. It should have been done the year before, but I had been over the job and didn't happen to find it. Neither did anyone else, until we were actually on it ready to work.

This particular area had to have the widening done, base placed on the newly bladed strip, and then it could be sealed later. This place would be skipped, of course, in paving until everything is all perfectly ready.

Prime coat was placed on all the courts and roadways with the exceptions noted. And these exceptions, of course, were the hard-to-handle places, and we'd have to use what is called a *pot*—it's fixed-up asphalt pots, fixed up with a hand spray, so the workmen can get in and spray these places, which cannot be done by the big distributor, with our angles and spots near the concrete boxes and so forth. And the contractor's cautioned not to spray black asphalt all over the concrete, so it must be done by hand-spraying. (The name of this particular pot was taken from the word *bitumen*, which is another word for asphalt. Of course, for short, they call it the "bitch pot," and this is an abbreviated nomenclature, of course, for *bitumen*.)

The rate of application was between two-tenths and twentyfive-hundredths of a gallon per square yard, and the finished prime looked pretty well; but trucks hauling plant mix surface probably would damage it in some places. The near red or—I guess it was red or some such color or hue on the base—was now lost and turned to black where the seal was applied.

Paving started Tuesday, August tenth. I spent the entire day on paving and assigned the base checking to tester Guy Oliver, who would be assisted by Larry Carpenter. They would give me the quantities at the end of the

day. Larry, the grade setter, had already set his string line to give the paver a guide.

Paving equipment consisted of Blaw-Knox paver, a Ko-Cal loading elevator. This elevator was necessary because some of the trucks were belly-dumps, which could not be unloaded into the paver box. The elevator would pick up the windrow dumped by the belly-dump, and the hot mix would be transferred over into the paver box, and the whole system would travel right ahead. It made quite a train with truck dropping windrows, elevator picking up paving and dumping it into the hopper, and the paver with the hopper in front moving along; and behind the paver, I would take temperatures, keeping the roller off 'til I got my thermometer back out, and the breakdown roller would be behind that. And behind the breakdown roller, way back quite a ways, would be a rubber-tired roller. The rubbertired roller couldn't be used on the very hot asphalt because it would stick to the tires. The steel roller for the breakdown had a water tank on it, and water was continuously pouring over a cloth brush and gradually keeping both rolls wet. If that were not done, the pavement would pick right up on the roller, and sometimes when they ran out of water, there was a mess to clean up before the roller could continue.

The elevator would pick up windrows, of course, that would go overhead and drop down into the paver box. Sometimes the paver had to be stopped because the loads were dumped in too thick a windrow, and the paver would be overloaded. When that was the case, we usually had trouble because of the weight up there in front. The runners would dig into the base and bring base right up into the paving mix, and that would leave a mess. So that was very important to keep that load just ahead of the paver down to a bare minimum.

We always had a loader standing by to pick up excess, and that was done, of course—operations would have to stop 'til the loader got the excess out of the way. It was not possible to get uniform feed from these belly-dumps, but the contractors liked to use them because they were big trucks; yet it was cheaper for them—they could make more money on delivering the paving than they could by using end-dump trucks, which were smaller trucks. The end-dump trucks had an end gate, which could keep the amount of paving material that goes into the hopper rather uniformly, and there was never much chance for getting the hopper overloaded. But as inspectors, we can't tell the contractor just how he's doing anything, as long as he gets a finished job which will meet all requirements.

Our rollers were a Galion steel two-wheeler for breakdown roll and an eleven-tired rubber-tire machine for finish rolling. When I say "eleven tires," tires were all side-by-side one big long stretch, and there were little boxes up on top, which were weighted down with boulders and so forth, to give it more weight. The steel roller—both rolls were filled with water, or rather the larger of the two was filled with water, which gave the weight needed. Sometimes the light roller was needed; all you had to do was take some of the water out of the roller. A standby water tanker was on the job to furnish the steel roller a reservoir with water as needed. That water just running over those surfaces of those two rolls has to be there all the time on the breakdown.

Personnel on the paving were one paver operator (his name was Frank Tessier), one screed man—better define what a *screed* is. The paver operator sits up on top of the machine, and ahead of him is the hopper which caps the paving from the truck or from the elevator; and that paving is moved back and forth by screeds—looked like long

rakes that worked back and forth; and the height of the paving is adjusted by the screed operator on behind. If we want two inches of finished paving, it usually takes about two and three quarters inches of the mix right behind the paver. It is partly compacted, but not thoroughly compacted. Then, of course, by the time it is rolled with a breakdown roller, it should be two inches. Practically all the paving on these Boise-Cascade jobs, the thickness of the paving was set at two and a half inches.

'course, when these longer main roads were fully paved, they would be thirty-six feet wide—let me see, that would be [figuring]—yes—then there's a five-foot strip out beyond that, which included the dike, and that was always left 'til last.

One other thing which I might mention here (may have mentioned it before) is in cool weather especially, a cold pad gives some trouble in sticking to the next pad, which is put along beside it. The hot pad should stick to the edge of the cold pad, but if it's too cold, it won't do it. So in a lot of cases, you have to send a man along with a bitch pot and put a tack coat on. That's usually done with hand spray. That helps to anneal one pad against another. When that has not been done properly, I've noticed many times, there will be a raveling right at that intersection, and the raveling gets bigger and bigger and finally makes holes. So it's very important that the hot mix going onto a cold mix—very important to be sure there's an annealing action. In hot weather you don't have to worry much about it, but if the day happens to be cold, it's best to get a tack coat of some kind on the cold edge.

Paving progressed quite well, considering the shortage of trucks, but there was an hour and a half delay in the morning due to a broken belt in the hot plant. That was, of

course, over near Truckee. Temperatures of the mix were satisfactory, and all workmen, including screed men and rakers, knew their jobs and did well. I secured a sample of the mix for extraction and sieve analysis from load Number Fourteen, which was placed at about Station 38 + 00 on Saddlehorn. It was sent to Sharp and Krater in Reno.

Final rolling of this first day's paving was not finished 'til seven-thirty P.M. I examined the lay-down the first thing Wednesday morning, August eleventh, and it all appeared to be okay. Depth checks were made, and while there were some variations, as was to be expected, the average depth was very close to two and a half inches, specified.

First loads of the paving mix arrived on the job at seven A.M. the following day, and were placed in ten-foot pads adjacent to previous work. But work was not continuous because the paver was down from eleven to twelve, and again from onethirty to two-thirty. Trouble was a broken fan, and there was no more paving until a new fan from Reno was brought to the job and installed.

During this down time, I went over areas where base had been placed yesterday, and I was accompanied by. Roger Henry, assistant superintendent, and by Guy Oliver, the tester. I found Ophir Court, Loma Court, and the western side of Tumbleweed almost ready for prime coat, but the trucks hauling paving mix over some of these places on Tumbleweed had damaged the base. More water was added, and these places rebladed and rerolled. I found also the blades were almost down to subgrade near the cutbanks, and I requested Roger to secure more base and bring depth up to specs.

Only thirty truckloads of paving laid this date, due to breakdown of paver. Only five temperatures were taken of the mix behind the paver, and these were all okay.

Thermometer readings showed two-sixty-five, two-fifty, two-fifty, twofifty, and two-fifty—quite uniform.

On Thursday, the twelfth, the asphalt plant in Truckee was down until ten o'clock in the morning due to clogging of oil line; thus our first truckload of mix did not arrive until ten-forty. In the meantime, I checked yesterday's paving and found average depth about one quarter inch low. I also met Erik Beyer, and we found some short widths at the top of Saddlehorn and on Tumbleweed. We found LeRoy DeMartin and showed him the bad places. I asked that the lay-down at the rear of the paver be increased from three and an eighth to three and three-eighths to make sure of proper thickness. Only by increasing this at the rear of the paver could this be done; however, your screed man—once he gets that set—should leave it alone. I have seen greenhorns on the screed; they would just ruin your job by continually putting it up and down. However, all of these people on these jobs on the Boise-Cascade work had very good screed men.

Once the paving started, it progressed steadily; however, in order to make the time up that was lost, the plant was kept running late, and late arrival of the last round of trucks, together with the considerable amount of handwork necessary at intersections, made a twelve-hour shift, ending at seven-thirty P.M., except for finish rolling, which was at dark.

Guy Oliver was placed in charge of base inspection and held off acceptance of all areas until they were well watered, bladed, and rolled to specification density. Additional gravel was hauled to the low places we had found on Tumbleweed and on the easterly side of Fallen Leaf, and on Antler Court.

At two-thirty P.M. Ophir, Loma, and west Tumbleweed—a distributor was put to work applying the specified twenty-fivehundredths

of a gallon per square yard of MC-70 prime coat. However, the truck ran out of oil before all designated areas could be covered.

Referring again to the paving, twenty-eight truckloads of hot mix were placed this date, each truck containing approximately twenty to twenty-four tons. Thus something like six hundred and forty tons were laid. Temperatures of the delivered mix were plenty hot—240° to 270° Fahrenheit. In fact, because of late afternoon deliveries, the water truck was driven over the paving after breakdown rolling to cool off the mix sufficiently, so the rubber-tired roller could finish compacting it before dark. If the rubber-tired roller gets on when it's too hot, of course, he can't do a job.

The second and third ten-foot pads were placed on Saddlehorn; the first and second pads, eleven- and ten-foot, respectively, were placed on the lead road to Chiquita; two pads on Chico, and one on Bronco, and a portion on Poco Court.

Tomorrow's paving is planned pretty much for cul-de-sacs, narrow widths, unfinished pads, and intersections. Two tenwheeler dump trucks will be used on the special paving areas. They will dump windrows hauled in from the plant. The loading elevator will be eliminated because the two end-dump trucks will be filled from a stockpile (the belly-dumps, of course, contributing to the stockpile), and a loader will be there to load these end-dump trucks. They, of course, can empty directly into the paver. I had wished this could've happened all along, because it's an awful mess to bother with those belly-dumps.

And now this brings us into another problem: they were going to use one of these cul-de-sacs for a place to make the stockpile, and in order to do that and not get mixed up with subgrade or base, a pad of one to one and a half inches thick of plant mix had to be laid and rolled before the stockpile

could be built. Fortunately, the red base had covered a portion of this rock pile, and as I recall, the rest of the base was put down over the subgrade, even though some had been covered with blacktop. And the whole thing was blacktopped again and rolled before the stockpile was made.

Friday, the thirteenth, was not necessarily an unlucky day, but it was involved in a new system of paving, of course, one of considerable handwork, in the cul-de-sacs, intersections; and much slower progress than usual resulted. Use of a stockpile hot mix at a job site area involved special heaping of the mix in order to reduce surface area of the pile, thus tending to preserve heat. I have some qualms about the success of such a system, but it worked at this time of year (in the summer heat).

Initial temperatures of the truckloads were purposely raised because of loss of heat involved in this double transfer system. I checked temperatures and found the hot loads dumped at 285° into stockpile. They were cooled by the time they reached the paver to about 225° to 250°; this was still workable. The trucks did not quit building stockpile 'til quite late; thus the entire mass was not hauled to the paver and laid down and compacted 'til very late—eight o'clock in the evening, in fact, thus making a twelve and a half-hour day with four and a half hours at time and a half for all operators, laborers, and the inspector on the paving.

Base course laying was finished at the regular five-thirty quitting time. Len Way, Boot Court, and Lantern court were said to contain sufficient base material; and after blading, watering, and compacting, they will be ready for depth checks, after making whatever the adjustments necessary. Then they can be primed and ready for paving.

My copy of the daily diary for August thirteenth is submitted in its entirety for

future reference by researchers.* I cannot do that with some of my daily diaries because I find the carbon papers were unsatisfactory, and I'm unable to read them. However, I do have my little pocket notebooks, and I can secure quite a few notes from those.

This week's operations have been described by me quite in detail for sake of showing exactly what has to be done—or at least, what actually was done—on the job. Much of the detail for the balance of the job will be omitted, but significant operations and problems will be explained. It's about the only way you could fully explain, but, you simply have to get some of the details in.

In late afternoon Friday, LeRoy DeMartin decided that some base work should be done in order to keep ahead of the paving. Thus Saturday, the fourteenth, was a working day with John Robinson on the blade; one loader, operated by Roger Henry (the assistant superintendent); two rollers; and one water truck. We actually started at six A.M. and finished at six thirty P.M.

There was a big stockpile of base, which was used by Roger to fill in where the compacted base was too low. This additional base was thoroughly watered, bladed by John Robinson, then rolled and checked for density and thickness by Guy Oliver, the tester, who had also consented to work this date. (I believe he also was given overtime by his testing department.)

John Robinson removed the badly scored temporary surface, which was placed for stockpile plant mix; in so doing, he removed some of the red scoria base. This wasted material could not be used again and was hauled to the waste dump. John and I estimated about ten tons of plant mix surface was wasted. Since this had already been added in for pay quantities, an adjustment would have to be made.

The grade setter and one laborer were added to the crew. They assisted checking base depths after blading and rolling. Roger's stockpile ran out, and he had to go as far as Valley and Tyner and use windrowed base for those areas to fill in the sections to be hurriedly finished. Part of the trouble with insufficient base was due to poor checking of depths by a man Roger had helping check base on Tumbleweed during the week. He had told Roger that all base depths were okay. I did not have time to check on it 'til this date. I found a supposedly checked area on Tumbleweed about six hundred and fifty feet long that was one and a half inches short in the base thickness. This was at a critical time in the afternoon, when the distributor with the load of prime coat was ready to prime over this particular area.

I thought about the thing for a while, then worked out a proposition, which I gave to Roger. This would make a substitute with extra plant mix to take the place of the base shortage. Structurally considered, the plant mix surface has approximately twice the support value, inch for inch, of base aggregate. Thus three-quarters of an inch of extra plant mix surface would give the same structural support value as an inch and a half of the missing base. Roger agreed, although the cost of the plant mix per inch was more than twice the cost of an inch of base. Thus we were able to keep things going; I did not have time to check this with the district engineer, but I [was] sure he figured I knew pretty much about it anyway, so there was no problem there.

Plant mix surface could thus proceed over the whole section laid out for Monday and Tuesday. The only further adjustment to be made would be to acquire a warping of the

*See Little papers, UNR Library

plant mix to coincide with the surface of the drop inlets. You see, with three-quarters of an inch short, the plant mix would have to be up even with the concrete. So there would be some handwork there, but they had expert hand rakers who could make that—the rollers would take care of it, rollers and whackers. Otherwise, of course, the DI [drop inlet] surface would be three-quarters of an inch higher than the adjoining pavement.

The amount of plant mix surface thus used would be 99.6 tons, which would be deducted from the total weight of plant mix surface for the day that it was placed. The cost of this amount of surface at thirteen dollars per ton would amount to about a thousand and ninety-five dollars.

All other areas to which extra base was added were minor, but were well cared for this date. Compaction values obtained by Guy Oliver on the area were all ninety-five to a hundred percent. This was another long day.

The first thing Roger Henry did Monday morning was to fire the man who had misrepresented the base thickness. This person had borrowed my grubbing hoe in order to check the base depths. He left in a huff with his pickup at full speed, and my grubbing hoe left with him. (Roger replaced it, however [laughs].)

The method of paving adopted by the contractor was to pave long roads first and leave the cul-de-sacs and their approach roads, along with the five foot strips, until last. in so doing, there would always be repairs to make on the paved long roads due to the heavy trucking over them to pave the cul-de-sacs. The contractor was made to understand that all necessary repairs would have to be satisfactorily made. Of course, he knew that and was agreeable.

This was the biggest plant mix surface laying on the job to date, forty-three truckloads

being laid and compacted between seven-thirty A.M. and seven P.M. This amounted to approximately 940 tons or roughly twelve hundred dollars worth.

Portions of the Saddlehorn, Tumbleweed, and Fallen Leaf areas received the paving. Blading and watering base was going on at the same time, but it had started at six o'clock in the morning. Guy Oliver, assigned at checking base thickness, found satisfactory values on Tyner from Station 148 to the intersection with Valley, and on all of valley from Tyner intersection to and including the court. The first, fifth, eleventh, twentieth, and thirty-second loads of asphalt paving were checked for temperatures, and all were found to be from 250° to 270° Fahrenheit—very good. (A copy of report Number Forty, dated August sixteenth, is presented for inclusion in the files. This report will show twenty-seven workmen from manager to laborer on the job and list the various kinds of equipment.)*

On August seventeenth, picketing of the asphalt plant at Truckee occurred; thus only five loads of paving reached the job. All five loads were placed on a eleven-foot pad on Tumbleweed. Five of the paving labor crew were transferred to the job of raising manholes and valves on paving already laid. Usually this is the last operation after the paving is all in, but if some of the paving is already laid and acceptable, it could be done there; and this kept the men busy.

Base was placed on spots on Tyner and adjoining areas which were found too thin. The water truck and blade and rollers were busy there, with John Robinson doing his usual expert finishing job.

Two of the courts at the lower end- of the job had not been readied for base. The

*See Little papers, UNR Library

subgrade was bladed to conform to grades set by the grade setter and were watered and compacted.

Two very low values on Tyner for compaction on the base were brought up to standard by rewatering and rolling with the rubber-tired roller. Two compaction tests on base on Valley, and seven on Tyner after recompacting, all gave values of ninety-five percent or above.

Victor Clyde, inspector on Unit 5, visited our job in the afternoon. I conducted him through some of the paved areas, also showed him the work done by the Gradeall on fill slopes. Vic was particularly interested in methods of paving cul-desacs. He was complimentary concerning Shea's operation with respect to general appearances. Vic had been in charge of many, many paving operations in the state Highway Department, and he was also chief construction engineer and later chief maintenance engineer. But the state Highway Department very seldom has cul-de-sacs or round places in their roads, and paving those—the method of doing—bothered Vic to some extent. It would bother anyone, but actually it takes an expert crew to do it. It's like putting a square peg in a round hole—you got the square paver, and you try to pave on a curve; you start going around the curve, and you end up with another hole in the middle. So they do the best they can from starting at the back and going ahead, and the rakers will rake the material; sometimes they will hand-shovel to get the last bit of the circle in place—hand-shovel and hand-rake, and then the roller comes in. And if you have expert laborers, you can really do a good job. But it is confusing to anyone who has not done it.

The MC-70 prime arrived by distributor truck and was applied to parts of Tyner, to Valley, to Lantern Court, and to Len Way,

as far as the base course was ready. This was started around five o'clock at the rate of twenty-five-hundredths of a gallon per square yard, and I stayed on the job 'til the load was all used up at six-thirty in the afternoon. LeRoy DeMartin tried to get paving material from Reno, as the Truckee labor trouble had shut that plant down.

In the morning of August eighteenth, there were still no arrangements to get paving material out of Reno. The crewmen, ordinarily assigned to paving, were put on cleanup, and excavation, and raising valves and manholes through the finished paving. The last year's crew had placed the water line in a helter-skelter manner before the roads were built up to grade. Some of the water valves were as deep as five or six feet beneath the surface in fill sections. The laborers kept complaining as they were digging down there, there was no water valves there, but were told to keep at it, and finally they found 'em. The way this happened, was that the water lines were probably put in before the original subgrade was adjusted. Thus the water is by pressure, and you do not have to keep an even grade. So the workmen just took the ups and downs as they came, and where there was a high fill section, of course, those valves were down there deep. Also manholes have to be raised, and as I've stated before, that is done by putting concrete rings and finally metal rings up at the top and then a metal cover even with the pavement.

Subgrade finishing was completed on Pinto, Alden, and Dale courts. Spencer Court, where the Shea office was located, was still to do. Tester Guy Oliver found good subgrade compaction, but could not finish all he had intended because of a broken probe, which deferred his testing operations 'til another probe could be obtained.

In the late afternoon I had a call from the Highway Department, relaying a message

from Helms, a Reno contractor. His message was for me that he could furnish plant mix surface tomorrow. The message should have been delivered to Shea's manager or to Erik Beyer. Helms must have thought I was chief of operations. I delivered the message to proper authorities. [Laughs]

On Thursday the nineteenth, six Helms trucks managed to haul twenty-one loads of plant mix surface from the Sparks plant to Unit 4. Because of the long haul and shortage of trucks, all loads were dumped in Antler Court, where a loader piled the material in one big heap, so the heat would be better retained 'til all the pile could be used. Two dump trucks hauled from the stockpile to the paver. The total tonnage today was no more than five hundred; and the tedious, slow-to-pave cul-de-sacs off Fallen Leaf were paved, and the third pad on Fallen Leaf itself was finished. Temperatures of the mix, as laid, were satisfactory, but one was in the low area of around 210°; nevertheless, workmen managed to get it in place, and after finish rolling, the surface looked okay.

Because of the odd-curved shape of the cul-de-sacs, much hand-raking by laborers is always necessary. Paving this curved area with a linear-operating paver, as I've said before, is very much like trying to fit a square peg into a round hole. Erik Beyer visited the job while paving was under way on Fallen Leaf, and called attention to breakdown of edges of pad Number Two by hauling vehicles. I told him that there would be many such places before the job was done because the vehicles would be hauling back and forth there many times, and that repairs would be made by cleaning away any dirt or loose gravel, priming, and refilling the bad places with hot mix by hand-raking, with the roller working along with the raker to secure compaction. In colder weather, a cove edge or on a pad, of course, would have to be

primed, as I have stated before; and that was the case with most of these bad places. Even though it was not cold weather, they had been dirtied over so much that simple brooming would not clean them thoroughly. Therefore, it was wise to use the bitch pot with a hand spray and hit these areas before the hot mix was placed on them.

Gravel base was being hauled this date by eight trucks, forty-seven loads going on Pinto. The grade setter was busy setting red flag tops for base thickness on Lariat. Two small courts, Alden and Dale streets, were also receiving base, while subgrade on Spencer Court was being bladed, watered, and rolled in preparation to receive base.

Guy Oliver had only one passing compaction test but was too busy checking for depth to make rechecks this date. I examined the repair of bad spots noted on Thursday; I did this the first thing Friday morning and found the workmanship there excellent.

Some trouble was had on one side of Lariat with the base course compaction. The water remained in the base without penetration; that is, the water did not go down into the subgrade.

The reason for it was a very hard, semi-impervious material in the subgrade. Thus the compaction values could not reach the ninety-five percent required for the base because the excess water did not leave it. I took the rollers off and let the base stand overnight, and put the rollers back on the next day without adding any more water. This did the trick. Overnight the hard subgrade had eventually absorbed the excess moisture, and Guy Oliver's density tests were okay.

I spent most of my time watching the paving but tried to check base also as much as possible. Guy Oliver, however, was good help on the base and usually could check depths and widths of finished or partly finished base.

He did this in addition to making density tests of both base and finished subgrade.

There were seven trucks hauling plant mix surface from the Sparks plant of Helms and eight trucks hauling base from Bill Hart's red cinder pit near Hirschdale, so that by the end of the day, Chiquita Court, Chico Court, Parcel A, and a portion of lower Saddlehorn were all paved except the fivefoot strips at the edge.

While waiting for the paving machine to move from one court to another, I managed to check temperatures of the plant mix stockpile and found 'em satisfactory. Guy Oliver had the base course pretty well under control; however, I went with him in late afternoon to Spencer court, which had been a sort of a rocky mess to grade. Nevertheless, Robinson, with his usual thoroughness, assisted by laborers, had done a very good job preparing the subgrade and picking rocks. A loader carried rocks to the dump ground.

I had to have some help from Rich Robinson, who was running the loader over at the stockpile. Rich was always there as the trucks came in, and he consented to pick up the weight tickets for me; and he would deliver them to me at the end of the day.

Monday, August twenty-third, it was the same story with respect to the trucking over at Truckee. The strike continued, and the only asphalt available to Shea had to come from the Sparks plant of Helms. There were only seven trucks making long haul through Carson up the Clear Creek grade; Mount Rose grade was too tough, although it was shorter. Only twenty-seven loads were received this date, amounting to a small quantity of 612.6 tons.

One truck had trouble with the release valve that operated the belly-dump. Considerable time elapsed before the repairs were made, but the temperature was still okay

as the load was finally dumped. Guy Oliver was not present, due to a back injury. Sharp and Krater sent a substitute in place of Guy, but I can't remember his name.

Robinson and another blade man finished trimming the compacted base on Pinto and Dale, Alden, and Spencer courts. Compaction tests on these areas were good. But the section on Lariat east of the water tank—southerly—was still below ninety-five percent. Compaction on base, more water, and rolling was necessary there.

One pad of paving was finished on Tyner as far as Doeskin, and a portion of the first pad was laid on Valley. Because of the long haul, about one-fourth of the paving temperatures were down to near 200° Fahrenheit but were still hot enough to spread satisfactorily. This was August, and the temperature was high enough that it could be done. This was another long working day of eleven and a half hours.

August twenty-fourth, all operations on base course were finished, and both blades left the job. One blade man, by the first name of Roy, had an accident on the way home. His pickup left the road, and both his hands received broken bones, and his chin was injured. This day was also the last day for the tester from Sharp and Krater, as all subgrade and base compaction and other tests were finished, and retests made and okayed.

Due to slowness of loading at the Helms Sparks plant, which also ran out of asphalt for one and a half hours [laughing], plus the usual long haul, this was another slow day on paving. Only twenty-eight truckloads of hot mix were placed, tonnage amounting to 638.

One truck broke down in Carson City, and his load had to be transferred to another tractor. The load did not reach the job 'til just before seven o'clock. (We were waiting for it.) It was spread and rolled, however. The roller

man did not finish 'til nearly dark. I arrived at home in Carson at about eight o'clock.

Base course, not yet primed, could now receive the usual twenty-five-hundredths of a gallon per square yard of MC-70. One distributor load arrived at three-thirty in the afternoon and was spread on Rock Rose, Doeskin, and Pinto courts and approach roads and part of Lariat Circle.

Wednesday, August twenty-fifth, we were surprised by Helms. He apparently was able to keep fourteen belly-dump trucks running at full shift to our project. Forty-one truckloads with total weight of 944 tons were placed on portions of Tyner, the main street in this subdivision, and one complete pad was laid on Woodridge. There were only four cool loads; their temperatures were as low as 195°, and went up to better than 210°. All others checked were either 245° or between there and 280°. The cool loads were successfully laid, however. By use of belly-dump, which spread their windrows on the roadway directly in front of the paver, a Ko-Cal elevator had to be used to lift the windrow and place into the hopper with a paving machine.

As there was no other operation but paving this date, I was able to stay with the spreading, rolling, and operation all day. Crew consisted of LeRoy DeMartin and Roger Henry, the bosses; Frank Tessier, chief paver; the screed man; two roller operators; one water truck driver; and of course, the fourteen truck drivers were Helms' crewmen. The water truck was a small one, as only the twelve-ton steel breakdown roller had to be supplied with water. The reason for this, I have explained before.

Paving material was still coming from Helms on August twenty-sixth, as the truckers' strike was settled this day; and fourteen trucks made the first trip, but some were not working in the P.M. Forty truckloads

were placed today on Tyner and Woodridge, a total, approximately, nine hundred tons. I had visits by Erik Beyer, district engineer, in the morning, and by Mel Fodrin, who represented Boise-Cascade, in the afternoon. A light shower started about five o'clock and continued until it became a hard rain at six-twenty. Paving was all down on the road before the rain started, but both rollers had work to do. The rubber-tired, final rolling was not finished until a little after six-thirty P.M. All temperatures were taken as usual just behind the paver before the breakdown roller got on that particular pad. All the temperatures were 230° or above, this date. Equipment and personnel—the same as yesterday. (It must be noted that both LeRoy and Roger, although bosses, were doing raking and other handwork to help out on the intersection and other places where much handwork was required.)

Friday, the twenty-seventh, I arrived at seven o'clock and immediately reviewed the damage done by yesterday's hard rain. The five-foot, unpaved strips and dikes—sections—suffered considerably. A lot of the base was washed away, and there were channels (some of them quite deep) made along these five-foot sections. Damages were worst on the steeper grades, especially on parts of Saddlehorn, Tumbleweed, Tyner, and valley. Roger Henry said repairs would be made by using a loader to pick up base, where possible to do so, and haul more from Hirschdale if necessary. Hand labor would be used to fill in the ruts, and the whacker would be used to do the compacting.

Paving started on Pinto, and two and a half pads had been spread by ten o'clock; however, the paver hopper had been overloaded again, and this was digging into the base for a distance of about thirty feet. The resulting mixed base and paving was used to fill the

ruts and the holes, and was covered by enough paving-asphalt mix by hand to make a one-inch overlay, which was compacted later by the rollers. An additional inch and a half would be placed in this area when the five-foot strip was paved. Thus, there would result a required two and a half total thickness of uncontaminated paving.

Softened by rain, the base was not stable enough to withstand the extra heavily loaded paver passing over. The base dried somewhat later in the day, and by using caution about overloading the hopper, the paving continued on parts of Pinto and Tumbleweed on the north side, clear down to the Valley intersection, in fact.

The 650-foot section which was short of base by an inch and a half was paved this date, using a total compacted thickness of three and a quarter inches, thus producing the load support required. The slowdown, caused by the soft base, resulted in limiting the tonnage of paving to 829.75 tons. Temperatures of the mix were satisfactory. Rolling, however, did not finish until right around six-fifteen in the evening.

Monday, August thirtieth, was a banner day, as far as paving was concerned. There were extra laborers put on by all parties—laborers, extra laborers, and extra truckers. The extra laborers were required to handle the extra work at intersections and in courts, and a total of fourteen hundred tons (or just a little over) paving was spread and compacted between the hours of six-fifty in the morning and six o'clock in the evening. Eighteen belly-dump trucks, some of them double, were hauling plant mix surface. Ten of them were hauling from Helms plant in Sparks, and eight from the Shea plant in the Truckee area. (The strike, of course, was over a day or so before.) There was sometimes as many as three truckloads on the job at one time, and some

had to wait their turn to unload. The paving crew really had to put on steam to keep up.

Delivery from the two sources was about equal in tonnage— 700.97 tons from Shea's plant and 703.50 from the Helms plant. I will not go into detail regarding where the paving was placed this date. Temperatures taken immediately behind the paver were all okay, except a single one, showing less than two hundred. Even the cool one went down satisfactorily.

August thirty-first was a cool day and partly cloudy. All surfacing mix was now hauled from the Shea plant at Truckee, using thirteen belly-dump trucks, the first load on the job by seven-ten. Lariat Circle was given its third pad of ten-foot width from its highest point, traveling clockwise, to the bottom of the hill, after which the second pad was placed from the top of the hill, counterclockwise, down, and onto the Tyner intersection. Careless drivers in the trucks were causing problems by running over freshly paved joints, causing considerable time to repair. A third pad was laid against the second pad from the top of the grade on Lariat down to Tyner intersection. This completed all the paving on the circle except the five-foot strip and the dikes.

Paving continued from the Lariat intersection on Tyner, easterly, to connect with paving done last year by Teichert on Unit 2. The third pad was finished there by one-fortyfive in the afternoon, and the paver was moved to the Boot Hill Road, leading to the court of the same name.

About this time Mel Fodrin arrived to see how the job was progressing, and I discussed with him as much as I knew of the contractor's plans. Balance of the shift was spent on the Boot Hill area and on Len Way.

Two laborers were put to work this date on cleanup and the five-foot and dike sections.

The dikes were on the lower side of the pavement to carry water to the drop inlets, which were also placed on the low side. They were doing this in order to get ready to use a small, shoulder paver. The Blaw-Knox paver and the paving crew were to report to Unit 5 on Wednesday. Shea had already arranged with the contractor to do their paving. Vic Clyde would inspect the paving on that job. The remainder of Shea's crew would start paving the five-foot strip and laying the dikes. All paving mix would be dumped in the stockpile area at Antler Court. There would have to be two piles because the dikes could not be paved or made satisfactory with the coarse rock. The maximum-size aggregate for the dikes and the shoulders had to be three-eighths instead of three-quarter-inch rock. The loader, which was operated by Richard Robertson, would keep the piles separate and would see that the belly-dumped windrows were piled up into heaps, into the huge cone-shaped heaps, really, to retain as much heat as possible. Another problem would develop here, and that is, how much tonnage from that one big stockpile would go to one job, and on days when big payers were used in the other, how much would go to the other job. I let that problem hang for a while.

Regular end-dump trucks would haul the mix from the stockpile to Unit 5 and to the strip paving on Unit 4. This made an almost impossible problem to compute. But if the stockpiles were kept separate, and they had to be, the problem wouldn't come up until everybody was using out of the same pile.

Another proposition would be [to] correlate the truck scale weights, which are received every day (the end of the job), with the volumes placed in the two different jobs. The weights per cubic foot of the compacted mix vary, but an average would have to be struck by whoever computed these amounts.

And I believe Erik told me, when the job was all finished, that they managed to reach a settlement between the two contractors. Erik told me not to worry about the problem; he would do it.

Something should be mentioned—that is, the necessity of cleaning up the equipment at the end of the shift, especially the paver and for that matter, the truck beds. Any hard asphalt or any asphalt left on the paver or on the bottom of the trucks, when it gets cold, is really hard and it is almost impossible to get it off. So the thing to do is—at the end of the day, regardless of whether it is daylight or dark—is to get all that extra paving off the screeds and the hoppers and clean them up. The trucks, however, usually put fuel oil in the bottom of the truck, just a little of it, to make the loads slide out easier, and their problem isn't as bad as cleaning up the paver. I used to feel sorry for those two guys on the paver, having to work after everybody else was through. It'd probably be another hour, hour and a half just cleaning the paver up. I don't know whether the contractor paid them for it or not; I presume he did.

Wednesday, September first, the Blaw-Knox regular paver was transferred to Unit 5 job, as previously planned. Work on Unit 4 was confined to paving the five-foot strip and forming the dikes. The paving machine was a narrow one, made specially for this kind of job. It had a special attachment so that the asphalt dike could be formed at the same time. The machine was called a Red Seal shoulder paver. It was a homer made affair, as I recall. A small, steel Ra-Go roller was used to compact the five-foot mix behind the paver. The rig was put into operation at eight-forty A.M. at intersection of Saddlehorn and Tumbleweed. This machine was fed paving mix from an end-dump truck, which picked up the mix from the stockpile on Antler Court. After the

first hour, there was trouble with the paver, causing some delay. A three-eighths inch mix aggregate, as I said before, was used on this strip paving and the dike forming. Dikes were rather difficult to form, even with the machine, but on the straight-aways, they did not make much problem. But problems developed when you had to go around a curve with a dike; then a lot of hand-patting with shovels had to be used, and it took an expert to do it properly. Considerable hand labor was also needed at intersections.

Regardless of the trouble and a slow start, 2,634 lineal feet of the five-foot strip pavement and dike were finished this date. DeMartin was helping out on Unit 5, but Roger supervised the strip paving on Unit 4. Crew on this special strip of dike job consisted of a paver operator, Frank (I've forgotten his last name now—anyway, he was Frank), and one screed man, one raker, two laborers, plus the truck driver, and Roger Henry. There was no accurate way to compute tonnage of this special paving mix going back into the jobs. Thus the total lineal footage, times its cross-section would give volume. However, I believe that finally it was decided to pay for these strips by lineal foot of finished paving, rather than by weight, because the thicknesses were always the same. But this compromise, as well as others, was made between District Engineer Erik Beyer and the contractor.

Thursday's strip paving and dike work started shortly after seven-thirty on Fallen Leaf Court, where work left off Wednesday. This court was finished by eight-forty, after which the machine was moved to Valley at the east Tumbleweed intersection; and paving and diking followed down through Valley and Tyner. By noon the machine was down Tyner to the DI at Doeskin and by three-thirty had made it to a point about eight hundred feet from the Woodridge intersection. I said "DI"

back there—"DI" is engineers' abbreviation for "drop inlet."

There was no more mix available until four-twenty on account of the hot plant being down. Two more truckloads were put down by five P.M., which made another two hundred feet. Yesterday's rolling was not good in certain places, so a heavier roller was sent in to go over those places again. This day's work amounted to 3,390 lineal feet of dike and strip. Temperatures of mix were taken at stockpile and in the finished dike and were all 250° to 290°, which was good, because today was cloudy and cool.

Friday, September third, was a poor day on the paving jobs, as the hot plant broke down. I spent some time on the job checking for bad spots in the shoulder strips and dikes and came home at noon.

Mrs. Little and I drove to Fallon Saturday to take Ruth's hundred-year-old doll for an appraisal by Marian Ellis, a doll fancier and dresser. Estimated value of the doll was six hundred dollars, but later estimates, and by the same lady, after the doll was properly dressed, was much more.

We picked up some famous Fallon Hearts o' Gold melons and two Crenshaws, then drove to Fernley to Interstate 80, and on north to the swamps to secure some of those small, brown cattails, which make unique decorations. However, there must have been a crop failure by freezing in the spring because none were found. Only the foliage remained. We followed Interstate 80 into Reno and had dinner at Harrah's Terrace Room and then came home.

Labor Day, September sixth, we drove to Sparks where I played with the Reno Municipal Band at the celebration, as usual.

We started work Tuesday, September seventh, at seven with the same crew as we

had last week. The first several loads were placed on Tyner. This was all three-eighths-inch maximum size aggregate, to better form the dikes. Work was on Tyner and Lariat but continued only 'til the little homemade paver broke down at eleven-forty. It was not used again all day. Frank Tessier called in from Unit 5 and began trying to find the trouble after he arrived on Unit 4. Trouble was a broken pinion gear. It had been an ancient Ford vintage and probably would be difficult to replace.

Crew bosses and all men were sent to repair dikes already laid, but showing needed betterment. They also laid the fivefoot strip and made dikes by hand to use up hot loads hauled to the job—not as pretty a job as machine-laid, but figured we could trim it up later. A loader and small backhoe was put to work building the two places needing widening, so that paving could be completed. One was on Tyner and the other on Tumbleweed.

I reexamined all Tumbleweed, Saddlehorn, and contiguous courts, and found the washed-out shoulders—I had the base replaced and had them well watered and rolled and ready for prime coat and paving. At four-forty I called on Erik at the office, and he said Vic Clyde would help me tomorrow, as the big paver was being moved back to Unit Number 4. I must explain here that there was an agreement between the two contractors, Shea and the one on Vic's job, that all paving was done by Shea. But it began to get complicated now with the paving machine moving from one place to the other, and loads going Lord knows where. We managed to do only 2,110 feet of shoulder and dike construction before the little paver broke down. (A report of my diary Number Fifty-Five is included with other such copies for library file reference.)*

Both Vic and I arrived on Unit 4 at seven o'clock. The plan had been to use both the large and the small pavers, but the small paver was not yet repaired. So I went with the big paver, and Vic spent the first couple of hours at the office going over truck weight ticket records. He came back at nine o'clock and took over on the paving, and I went with Roger Henry to mark out parking areas and dikes. Roger had to leave early, so I continued alone with the marking until twelvefit teen, then went back to paving, as Vic wanted to leave on account of personal business.

First areas paved with the big paver were on Rock Rose and Len Way. There were at least four crews on various jobs. One two-man crew with the bitch pot were painting the cold spots so that the hot mix would adhere. A two-man crew was watering and rolling a portion of Tyner base, getting ready for third pad of hot mix. Another crew was on cleanup somewhere else. There were four crews to watch, and I had a bad enough time just watching the paving. I spent all afternoon plus a large part of the evening with the paving crew. The roads, especially the one in the Ophir Court, had all three pads laid, but nothing done on the court. These pads together with the Ophir-Saddlehorn intersection were finished by six-fifteen.

The belly-dump trucks had been working all day, and by six-thirty P.M. there was a young mountain of hot mix still on the stockpile. Somebody in the contractor's staff goofed; they should have shut off the hauling shortly after noon. Now the paving was continued even after dark, using our cars parked on the shoulders with their headlights furnishing partial visibility. We finished laying the last of the stockpile at eight-forty-five. Temperatures were hot enough

*See Little papers, UNR Library

to satisfactorily lay the material. Only 863.73 tons were laid because the operations were slowed down by having to move the paver from one place to another. It's a tediously slow process moving payers. I think the rollers were still at work in the dark, but I left; I had all I could do for one day [laughing]. This long day was at least thirteen hours for me, and the overtime—over the regular eight hours.

Next day, the rollers were put back on last night's job, as it was too dark to get a satisfactory finish with headlights. Vic would stay with the main paving crew this date, after this crew was paving 'til nine-thirty at night again because of having stockpiled too much material in Antler Court. That was all Vic's deal [laughs]. I was to be working with the shoulder paver, but since it had not been repaired until eleven-twenty A.M., I spent the time with Roger Henry going over the widening areas to make sure he would have necessary repairs made in time for paving with the main paving machine.

Necessary adjustments and repairs noted were finished by backhoe and loader by the end of the day. The shoulder and dike paver started operating at eleven-thirty, but the stockpile of three-eighths mix was not large enough to keep the machine going 'til quitting time at five-thirty. (Note that this was a separate stockpile from the one that Vic's crew was using.) We made only 1,515 feet of dikes and shoulders this date. Of course, Vic was stuck with the paver this time, and I left the job at the regular time [laughs].

On Friday, the tenth, I went to Lariat Circle, where the big paver was ready to operate, and discussed paving methods and widening with Frank Tessier (foreman) and Vic Clyde (inspector). I left my plans with Vic, as he was not familiar with the areas and the sections on the Unit 4. I managed to borrow Roger's plans when I needed them.

I observed cleanup operations on intersection of Alden and Tyner, and on Spencer, where the court stem intersected Len Way. These intersections, or parts of them, had been paved a few years previously, but it would be Shea's duty to make repairs to all areas where his equipment had broken the old pavings. These cleanups were essential before priming and patch-paving these areas. A lot of the paving, of course, which was hauled to Unit 4, had to go over these older roads, and they were broken down in many places.

The first load of the three-eighths-inch mix for the shoulder and dike work arrived at nine-thirty-five. This dike was increased by me over and above what was shown on the plans; I found many steep grades without dike protection at turns and other places where side slopes would run water over the shoulders. I discussed this with Erik, and he agreed. Extra work orders had to be prepared.

My crew worked in several of the newly designated areas, as well as in some of these shown on the plans. We placed 2,630 feet of dike and shoulder strips this date. Mix temperatures were good, varying from 250° to 285°. The hot mix on this shoulder and dike material had to be kept at higher temperatures because only small amounts were used at a time, and sometimes the work was slowed down by problems at turns and angles. Vic kept records of operations of the crew on the big paver.

Another Saturday was in order. The contractor was anxious to get as much paving done as possible during the warmer weather. Therefore, the large paver was at work again with Vic Clyde inspecting. I had the small paver and diking machine to watch, but the first thing at seven A.M. Roger and I checked measurements of dike and shoulder stripes with the measuring wheel. This is a wheel of about, oh, sixteen inches in diameter, which

as it turns, records in number of feet; and you can walk with it, or if you drive carefully with the car door open, one man can drive the car and the other run the wheel for measuring lengths. It's a handy instrument.

We found accumulative distance on Woodridge, Tyner west, Doeskin, Tyner to Second Creek, and Boot Hill. This total length was 2,630 feet. I went to the top of Saddlehorn and to other areas to examine previous days'—with a big paver—the paving crew with Vic's permission had changed the widening at the top of Saddlehorn by continuing the two-percent grade clear into the bank, rather than leaving a trench. It looked okay, and the dike would divert the water anyway.

Our next day with the diking machine which covered several areas, according to the plans, we had to use the loader to deliver mix for the stockpile, as the trucks were too long to deliver directly to the small paver, especially where you were going around curves. We ran out of the three-eighth-inch mix for about an hour, but more was delivered at three-fifty, and we finished all dikes and strips on Lariat Circle by five-fifteen. We then finished Spencer and a short piece of Len by seven P.M.

More check measurements with the wheel were made in the late afternoon on dikes and strips. We covered several areas on the south side and came up with a total of 3,865 lineal feet. This day's run of trench and dike paving amounted to about 240 tons of three-eighths-inch maximum size mix. Paving temperatures were all above 260° Fahrenheit. I made it home by seven-forty-five P.M. Another long day!

Monday, September thirteenth, began a very busy week. LeRoy, the manager, apparently had orders to speed both the jobs. The paving equipment was, of course, being used on both Units 4 and 5, Shea apparently being the paving subcontractor for the

Highland contract on Unit 5. He (that is, LeRoy) had orders to get the big Blaw-Knox paver back to Truckee this week.

Diking on Unit 4 was finished at two-ten P.M. Thursday, September sixteenth, and the diking machine was immediately moved to Highland job, where Vic Clyde was doing the inspecting. The paving of the main roads and courts on that project apparently had been finished, or were thought to be finished, on Thursday also. Thus the big paver with its crew were moved to Unit 4 to do overlay and patching on Second Creek and Knotty Pine streets. These streets had been paved on earlier projects, but the Shea trucks hauling base and asphalt paving mix had damaged the old pavement. There were many chuckholes and ruts. Thus Shea was requested to fill these ruts and chuckholes and place an overlay of about one inch to an inch and a half thick of new pavement.

Early Monday morning, I marked out some areas for diking on Unit 4 which were not shown on the plans. I considered this absolutely necessary on certain curves on steep grades. Heavy showers or rapidly melting snow in the spring would come speeding down these places, and no doubt would flow right over the fill banks on curves and in cuts and could make lots of gullies, not only in the shoulders, but on down the countryside. Both District Engineer Beyer and Shea managers agreed with me. This had to be done without waiting for change orders, as the contractor was about to finish diking on Unit 4. Measurements of the extra work could be taken after it was finished with change orders back dated.

The diking crew worked on five different areas Monday, and finished the day's work at six-ten P.M. with 3,780 feet laid. The tonnage of the mix, being all three-eighths-inch maximum size, was 400.29 tons.

Tuesday, however, was the banner day in laying dikes and shoulders. These were placed in ten different locations, some of which included the new areas I designated; and a total this date of 4,229 feet of dikes was laid, the longest single stretch being on Tumbleweed from the first drop inlet to the Saddlehorn intersection.

I spent some of my time checking temperatures both days, and also on Wednesday and Thursday. They stayed pretty well on the high side, as the hot plant foreman had been instructed to keep them high because of cooler September weather.

On Wednesday morning, I went with LeRoy and marked areas at the top of Saddlehorn, where more widening and diking was necessary. Doug Sherrot was busy with a crew of laborers and with a backhoe. They were digging out manholes and valves so they could be raised to the surface of blacktop paving. This always meant excavating through pavement base and some of the subgrade to the temporary metal covering over the manholes, and so forth. The locations of valves and manholes were supposed to be marked by stakes nailed to trees or by stakes placed on cut or fill slopes with the manhole number written on the side. However, sometimes this did not get done, or if it were done, somebody, especially in the inhabited areas—with kids—would pull the stakes out or they would get destroyed. Then since the covers of those manholes were made of metal, you could take a metal detector and find out where it was—most of the time [laughing]. I've seen the metal detector go haywire and stay that way, add people would have to do a lot of digging to find where the cover should have been. But you don't want to dig up your pavement base if you don't have to do it, so it was better to wait 'til you could get a new metal detector. Cleanouts at the end of sewer

lines also are found below the pavement and have to be raised. Those, too, have a metal top, which can be found by a metal detector.

Manholes are raised by placing rings over the top of the original cone, which may be as deep as two or two and a half feet below the top of the paving; and one ring after another is placed until the cover (sewer cover) will be just about even with the pavement. That takes quite a lot of juggling sometimes to get the right size rings in order to do that. Now, if you get that metal cover too high, it wouldn't matter in particular, except make a traffic bump in the good weather, but in cold weather, when snow is on the ground and the snow plows come along, you're in real trouble, so those covers have to be kept just slightly under the surface.

When these manholes and other structures—valves and so forth—are raised, there is, of course, a void all around them because you dig a bigger hole than you need—you have to do that—and that void must be filled. What they do, usually, is use base course, and (even where they'd gone down into the subgrade) tap base course around it to the bottom of the paving. Then later on, a paving-patching mix is brought in, and it's usually dumped off and spread by hand in these voids and compacted with a whacker. That's a lot of hand labor, but it's the only way you can get it done. There's more detail to some of this work than the ordinary person can imagine. He thinks, "Well, they finally got this job done. It sure took 'em an awful lot of time—it seemed to me it wasted a lot of time!" That might be what you would say, but it's necessary [to] take a lot of time in these jobs, and it must be done according to specifications.

Sewer mains and cleanouts placed across country on easements do not have to be dug out. Several inches of the tops of the cones

and maybe sometimes as much as a toot or more, as well as the metal covers, are exposed. Then when the maintenance men come along to make the cleanouts, there's no particular problem except sometimes the lids get stuck, but they have tools to open those.

I spent more time Wednesday with the diking crew than I did with Doug Sherrot's manhole crew; however, when the concrete is poured around some of these raised structures, I would observe that process, to take place in a day or two. In some instances (I have not mentioned this before) it's necessary to pour concrete instead of just using soil around these rings, as the rings are usually made of transite or concrete, and their mortar holds them together; but it's better to make sure that they're going to stay in place without being broken by traffic by pouring a concrete collar around the whole thing. That is very often done—not always. Of course, that is not necessary on the cross-country areas. Eight areas were diked Wednesday, totaling 3,251 feet.

Car trouble made me late for work Thursday, but asphalt plant over at Truckee had a breakdown; so I did not miss much of diking. After the plant trouble was remedied, diking continued until about two-ten P.M., and all the dikes, as shown on plans, plus several thousand feet of extra dikes I had recommended were placed. The dike and shoulder machine, then, was moved to the Highland's job of Unit 5, where Vic would watch it at least part of the time, and I would spend some time with it when I had the time.

This last day on the diking on Unit 4 was done in four areas, totaling about two thousand feet. These lengths were all determined by use of the measuring wheel on foot. Sometimes that could be done by two people, one driving the car, the other holding the measuring wheel out the window with his foot against the door to keep it from closing.

The regular paving crew had moved back to Unit 4 to do the patching and overlay on Second Creek and Knotty Pine. These two places, like I've said before, were damaged by the trucking; they're not actually on Unit 4 themselves but had to be repaired. I tried to split my time between the two paving jobs until two P.M. The main paver had started by traveling uphill, but the belly-dump trucks could not pull up the steep grade to dump the front of the paver. A change was made by having the truck come in on a road further to the north and moving the paver to the uphill starting point and work downhill. Three-eighths-inch maximum size rock was used by the large paver because of the relatively thin overlay. This was overlay, of course, on the damaged paving.

Chuckholes and truck-made channels were first filled by hand and rolled. However, the deep holes were too full of hot asphalt mix to roll properly right at first. So a water truck was brought in and spread water on 'em to cool them off, so they could be rolled sooner, thus save time. This all had to be done before the overlay was placed.

All overlay areas had to be cleaned by power brooms and then machine primed or tacked with a hand spray, using a bitch pot. LeRoy was determined to finish the overlay this date on the two damaged streets, Knotty Pine and Second Creek, regardless of how late the work day would end. The Blaw-Knox paver had to be loaded on a transport and sent to Truckee this evening.

There remained about eight hundred feet of the pad to lay at six P.M.; however, we ran out of mix by six-twenty. This left another hundred feet or more. In addition, the hurry-up job had made a thorough mess of things. The deep patches were still too hot to compact properly, even after watering. Unevenness in the overlay and spillage from trucks remained

throughout the overlay area. LeRoy would have been better off to have sent the paver on to Truckee without trying to do so much in a limited time. Erik and I both told him the job was a mess, and he agreed. He said he would get the paver back later and promised to do a workmanlike job at that time. These men— sometimes when a contractor has several jobs, the superintendent or manager on one job is always up against a rush from the contractors or chief boss to hurry up and get through with something so somebody else can use it, and that usually causes confusion and poor workmanship.

I arrived at seven o'clock Friday, the seventeenth, and immediately drove over Unit 4, looking for bad spots. I found several bad places in the dike work and some places which were omitted entirely for several feet. I used keel to mark these places. Extra piles of mix at transfer points had been partly removed, so we had piles of broken, wooden slats and other scraps on the pavement. I was curious to know where such refuse, when it was picked up, would be placed. The trucks were hauling it somewhere, but I hadn't found out the place; so I followed one truck to a steep grade downhill and got out of my car and walked it (I could drive as far as Bronco Court). And I noticed the fire road, which left the court in a northerly direction, had been traveled a lot. In fact there was one truck down there now. I walked down and got about a quarter of a mile below where it took off from the court, and it ended in a pile of debris, which I had been looking for. This was indeed a sorry sight in this tree-covered canyon. Nature lovers and ecologists would literally raise Cain over this. I found Erik and took him to this unsightly spot. He no doubt would see to it that this situation would eventually be remedied.

I traveled over the job with Erik and showed him unfinished areas and places

where roller marks were left on the pavement. He said the county would not buy the job until these things were corrected; also that some of the gutter had insufficient fill. He was much concerned by the messy job on Second Creek and Knotty Pine—well, he should be.

The nine-man crew with Doug Sherrot were busy with raising manholes and valves. Erik explained that the concreting hereafter was to be done around the barrels to within one and a half to two feet from the surface. This would be done for extra protection. The remaining space, of course, was to be filled with asphalt mix. This differed somewhat from the procedure previously used.

The fresh concrete arrived by two o'clock and made pours around nine manholes and twenty-three valves. Valves were concreted to the surface, leaving the metal slightly indented so that they would not be struck by the snow plows. Crews were separated into three groups, two of which were assigned to finishing, and one man went with the concrete truck. This was only a ten-hour day.

Monday, I was to inspect the diking on Unit 5, where the diking machine would be moved. That was Vic Clyde's job to inspect, but Vic was plenty busy taking care of other miscellaneous things. And I arrived Monday about seven-thirty and found the diking machine on Unit 5 and Apollo Court, and ready to work. However, they couldn't get started 'til nine o'clock because of trouble with the machine. The ambient temperature at that time was only forty-three degrees—that was cool.

Apollo Court was finished; then diking proceeded on Apollo Street in a southerly direction to Mount Rose highway. The dike machine stalled after going only two hundred feet. It was not ready to operate until two P.M. In the meantime, I spent my time going over the undiked streets, looking for potential overflow areas in heavy storms or

spring thaws. Conditions here were similar to those on Unit 4; several areas which showed no dikes on plans needed them badly, and I marked such places to receive dikes. Change orders, of course, can be made to take care of the extra expense.

Vic Clyde apparently had to leave his job temporarily, so that was the reason that he was not inspecting today. I did not know that 'til later in the day.

The machine worked for quite a while, but it was down again at five o'clock. Frank Tessier was brought in from Truckee and managed to get the machine working again by seven o'clock at night. We had to try finishing by car and truck lights in order to use up five or six truckloads of mix. (It will not remain in usable condition overnight, especially if left on the trucks.) My lights went out, and the battery played out, and I had to get help to start my engine. It must have been about eight o'clock when we left the job. It was too dark to observe the quality of the work.

(I had intended, in describing more of this fall work on the Shea job, to omit details and speak only of general features; however, these next several days were extremely complicated with work going on two jobs with several crews, each doing diversified work. I was the only inspector available, but Erik Beyer, district engineer, and Fodrin, who was employed by Boise-Cascade, gave me some help.)

I arrived on the job Tuesday, September twenty-second, one hour late because of necessity of recharging my car battery. (It had been run down the night before, of course, by using the lights.) Beyer and Fodrin were already on Unit 5, and had observed the mess made by trying to place dikes at night. I went over the situation with them, and we rejected a hundred and fifty feet of the dike. This material had to be

wasted and that much of the job done over. LeRoy DeMartin agreed to make repairs, as his observations in the daylight showed the bad condition [laughing], saying, "In the semidarkness last night, no one could tell for sure just what was going on." This is a fine example of "Haste makes waste." Was that Benjamin Franklin that started that little expression?—I think it was, but I may be wrong on that [laughing].

Overtime with the crew was also expensive because anything done past the eight hours is time and a half. It would have been cheaper to waste those six truckloads and start from scratch the next day.

A special water-diverting paving was to be done on the Mount Rose intersection with Jupiter Street. The grade was already built, but it was not done correctly, and there was only one way to take care of the water, and that would be making a raised area fairly close to the upper edge and get the water in between that and the main pavement. This would take quite a little doing, but it would have to be done.

The diking crew placed dikes on the west side of Apollo and around Mercury court, also placed a short stub dike on the fire road (this was all in Unit 5). Then the machine trouble started again; and there was no more diking for quite a little time. So I went uphill and marked with keel areas vulnerable to water action, but which designers, of course, had omitted from their plans. I found Swede, the Unit 5 foreman, and discussed the special paving needed at Mount Rose-Jupiter intersection, and also the need for extra diking, which the plans did not show. He also agreed that all dikes placed between the fire hydrant on Jupiter and Mount Rose had to be replaced.

About eleven o'clock, I drove up to Unit 4 and observed the Gradeall back on the job.

This time, he was filling behind dikes. He had already completed the work on several courts— Parcel A and part of Saddlehorn. He was helped by some laborers. All the rock and debris was piled up on the pavement to be removed later; a loader was used to do the removal.

I went back to Unit 5 at two P.M. and found the dike machine down again after finishing only two hundred feet, and LeRoy stated that there was no possibility of getting the machine repaired this date. Therefore, he had sent the diking crew back to the Knotty Pine and the Second Creek area to work on the overlay job. They were doing this at the onset by hand only, shoveling the material off the trucks.

I visited briefly the manhole- and valve-raising crew on Unit 4, then returned to Knotty Pine. Workmen had primed over the dusty pavement. I stopped operations 'til they scraped it off and washed the pavement, which they should have done in the first place. They then resealed the area to be overlaid. There was no Blaw-Knox or other machine to make the pour, so I okayed a method used by the state Highway Department. This method uses a pull-box, which can be attached to a dump truck, and the thickness of the overlay can be pretty well adjusted with this pull-box in two ways: one way by the height of the opening of the end-gate, and another way is by an adjustment at the end of the box. A man who has done this for a long time can be quite expert at it. But some of these boys were not familiar with it, and I don't think the condition, finished condition, was very good. Rolling was done, but even after the rolling, the operation didn't look wholly satisfactory.

This operation continue[d] until about seven-thirty P.M. to use up most of the three-eighths-inch paving mix, which was stockpiled for dikes on Unit 5. (Of course, that couldn't

be used on Unit 5 because of breakdown of that machine.) There'd be a problem figuring how much of the stockpile was already used on Unit 5 diking and how much was used on the overlay for Unit 4. These figures could be juggled by the contractor and Erik Beyer. I had too much to do to fool with that.

I did manage to get seven temperature readings of the mix between the hours of nine A.M. and six-thirty P.M. All but one were 225° Fahrenheit or better. The cool one at 205°, from the remnant of stockpile from yesterday, was tried and found we could use it, and we actually managed to get that in place.

The equipment at work on both projects this date included one Red Seal shoulder paver with the dike attachment (that's the small machine); and one small, three-horse power flap whacker (to compact); and a small Ray-Go roller; and one Gradeall; two end-dump trucks; One pull-box; one compressor (used by the manhole raisers); and five belly-dump trucks. Personnel consisted of DeMartin; Roger Henry of Shea; Swede, foreman from Highland; Doug Sherrot—he was foreman on the underground crew, as they called themselves (that was the people who had to dig down to raise the manholes); there was one paver operator; one screed man; two rakers; one rotor man; seven extra truck drivers; three laborers on paving; and eight laborers on underground crew. There's a lot of people to watch My daily diary report this date was several pages long. I made it home in Carson at seven-forty-five P.M. It was a long, long, day.

Wednesday morning, September twenty-second, I stopped at Unit 5 and found the diking machine still out of commission. I found the Gradeall still at work, filling back of dikes with some help from laborers. Rocky places in back of dikes could be filled by the Gradeall, but the fill material would

have to be hauled in from some other place. Ecologists would not allow fill to be obtained just from any old bank anywhere; there would only—could come only from designated places. Large quantities had to come clear from the Clear Creek deposit down where U.S. 50 intersects 395. There were a few spots, however, we could use for fill. On some of the fire roads which were not graded very well (they were simply emergency roads) sometimes there would be high spots, where some of the soil could be taken off and used for extra fill material.

A stockpiled mix, which was hauled in yesterday, was checked at several depths for temperature. The outside crust was cold and unusable. At one foot under the surface, the temperature was 255°, and at five-foot depth, 280°. The crust sort of acts as an insulator. Much of the stockpile could thus be used today in the dikes. Of course, the crust had to be knocked off and dumped in a pile to be hauled away later. We could use this material in the dikes, of course, provided the machine were repaired. Part of the stockpile, however, was used by the crew on patching and doing some of the overlay on Knotty Pine. More of it was hauled and placed around raised manhole rings. Fodrin was there, and later told me they were not using a tack coat at the edge to make the mix adhere to the surrounding pavement. I ordered this process stopped 'til the tack coat and bitch pot could be used.

LeRoy had the balance of the stockpile hauled back to the Truckee plant, and weighed and dumped. These weights would be subtracted from the total weight of original truckloads placed in the pile. Thus a fairly good estimate would be obtained of the weight of the material actually used and against weight of wasted material.

It took 'til two o'clock to get the diking machine cleaned of old, caked asphalt and

put in working order. It operated on Apollo for a short time, then went to Jupiter and completed the hundred and fifty or more feet which had been torn out because of its poor condition by working at night. And paving of the special water barrier at the Jupiter-Mount Rose intersection was also completed, and much of the spreading being done by laborers and hand-raking. Initial rolling left roller marks, but these were removed by further rolling when cooler, near the evening.

I finished the shift with the so-called underground crew on Unit 4, who had been raising valves and manholes. I was unable to make it to work September twenty-third on account of car trouble. I called Erik Beyer, and he said he would watch things at least part of the day.

Friday, September twenty-fourth, crewmen had started an eight-hour day at six-thirty A.M. and were to stop at three P.M. California deer season was to open Saturday, September twentyfifth; that explained the short day in part. And the crewmen bosses needed some extra time Friday to get ready for Saturday's hunt.

I arrived on the job at seven-thirty, thus put in only seven hours. I spent the morning on Unit 4, where a number of manholes were being concreted around the collars. I also observed two workmen excavating for valve raising, and another labor crew was raking and cleaning up where the Gradeall had filled behind dikes. They were doing an excellent job and had piled the rock and waste in neat piles on the pavement where a loader could pick it up and haul it to the unsightly dump at the end of the fire road off Bronco Court.

Yesterday a water line near this fire road was broken but was repaired late in the day. The excavation was not filled, however, because the repaired pipe had not yet been

given a protective coating of bituminous paint where—this must always be done where, making a weld, you take off the natural protection that was put on there and on the pipe first; you must always put a coating over there to protect it from oxidation or from chemical action by certain soil constituents.

I spent an hour or so with Erik Beyer and Roger on Saddlehorn, noting minor deficiencies to be remedied. We also discussed placing a three-by-twelve redwood water stop for erosion protection on cross-country sewer and water mains on Unit 4. This had not been done last year but probably would be started next week.

I visited Unit 5 in the afternoon and found that dikes had been placed yesterday on upper fire road and a portion of the lower fire road to the water tank. The water protection mound at the intersection with Jupiter and Mount Rose was still a little bit too low; therefore, it was tacked with emulsion and more paving added and rolled yesterday.

One load of three-eighths-inch mix was hand-placed in the ditch alongside the lower fire road and was hand-tamped. This was done to prevent erosion along this steep road. I never attempted to get my car down there because I knew I'd never be able to get it back up again, so I usually walked on those places. This job was completed this date before three o'clock. We agreed upon quitting time to accommodate the deer hunters.

Monday, September twenty-seven, was a cold day. A small amount of snow was on the ground, and it did not melt until afternoon. Morning temperatures were 28° at seven-thirty, 38° at nine-twenty, 40° at ten-forty-five. Afternoon temperatures were in the upper forties and lower fifties.

The contractor was to bring three-eighths-inch dike patching mix to both jobs, but this was deferred 'til Tuesday, hoping for

better weather. I observed concrete pours around manholes and valves. This was poured at 38° Fahrenheit—safe enough, if well protected. But I ordered the crew to get protection ready, which they did. They used Visqueen fabric to seal, and piled dirt over the top of the—.

The Gradeall was at work all day, trimming fill and cut slopes and placing earth behind dikes. This machine certainly saves a lot of handwork. Yet some handwork with shovels and rakes is still required, in rocky areas and hard-to-get-at places. Roger said three more days would be needed for the Gradeall to finish, as he had worked on Saturday. Apparently [the] Gradeall operator didn't care to hunt deer [laughs].

Staking was started at intersections of streets, marking places where street signs were to be placed. These signs, of course, were printed by professionals, and they're on metal posts, which would be set in concrete.

Erik was on the job in the afternoon, and I accompanied him on a preliminary examination of sewer mains on cross-country areas, and we made a rough survey of the needed erosion stops. I was to accompany Wes Spohn, marking the places where the stops were to be placed. We could not do it, however, until we both had the time.

I should stop here long enough to give a brief explanation of the need in use of erosion checks. First of all, the checks are made of redwood, a long-lasting wood which does not rot, but very, very slowly in contact with soil; and the checks are good, solid timbers—planks. In fact, they're three-by-tens and are ten feet long, and they are expensive.

A maximum spacing had to be used for a particular grade on these cross-country erosion checks, and I shall explain these. In sort of a columnar fashion, I'll first give the percent of grade, and the next remark will be

the maximum amount of spacing between the erosion checks. Okay, here we go:

% Grade Maximum Spacing in Feet

5-6 requires 100

7 requires 80

8 requires 60

10 requires 50

12 requires 40

15 requires 35

20-70 requires 25

Sometimes on very steep grades, it's necessary to put them closer or even to forget the redwood and put in a mortared rock riprap ditch.

In setting up an erosion control outlay over a sewer line or sometimes a water main, which has been placed on an easement, the grades, of course, must be known, and they are checked, and the number of redwoods required over a given distance. Then the manner in which those redwoods are set is very important. The redwood should be set across the disturbed area, which might be as wide as five or seven or eight feet, but not at right angles to it; rather, it is set at a slight angle of a few degrees, so the water will run off the redwood only on one side. Now this particular redwood, it'd be placed to the left of the centerline of the next redwood below it, if the angle is sloped to the right. The water running off the end of this first redwood then must—the second redwood must be placed in such a position that it will catch that water without making it run off the end of that particular side. It's set at a slight angle in the other direction, but the end on that particular side projects far enough to catch the water coming down from Number One redwood. Then Number Three redwood is set in this similar position to Number One, so the water goes back and forth, and in so doing that

way, its velocity is impeded, and it does not do much washing; and what washing it does, is usually thrust aside without making deep trenches. (I have made a little chart, which is not very well done, but it does explain, and that can be referred to if necessary.)*

There were a lot of these cross-country sewer lines; I may have mentioned before how many there were, but I believe there were about twenty-seven. Some of them would have as many as three or four, five manholes, and would have wyes for every lot they served. There might be in a certain easement as many as sixteen or eighteen lots, and you might have a distance, oh, practically a quarter mile long. That might take as many as ten or fifteen or even more redwoods, depending on the slope. If the sloping was steep, the lines were usually made as short as possible, but, of course, the designer, in setting up the lots, had to look into that so you'd not get things out of proportion.

This job of setting those erosion checks looks easy, and it is; but those boards must be tamped in good, but the top two inches should project so that they can catch the water. Later on, I'll explain how some of them were put on by inexperienced laborers when I was not there to see how they were doing it.

I noted in the afternoon of September twenty-seventh that the vee ditch below the drop inlet on Parcel A had not yet been constructed.

The trench, which was dug for hunting of a leak, which occurred in the water main near the fire roads way up at the top of Saddlehorn, was being filled after a repair had been made. I made sure it was thoroughly compacted. The backfill soil was sufficiently moist to compact well without extra water.

*See Little papers, UNR Library

Tuesday, September twenty-eighth, was another cold day and windy with the temperatures at seven-fifteen of 34° nineteen, it was 38°, ten-twenty-five, it was 45°. at four-fifteen it was 44°.

Early in the forenoon I helped Roger lay out a line for guardrail to be installed on Tyner at Second Creek. We then started staking at the intersection for installation of street signs. I went to observe the vee ditch construction, which carries water from the drop inlet on Parcel A. Rock lining to prevent erosion had been laid by hand for fifty feet, which was all that was required according to plans. However, another fifty feet was placed by change order, so that water would not be forced into the sewer main trench, which had been refilled but had not yet been taken care of for erosion control.

The crew was to go to Fallen Leaf Court to construct another rock-lined vee ditch after finishing the one they were on. A truck-mounted auger was brought to the job to excavate holes for guardrail posts and street signs; a compressor had been on the job and was put to work whenever the pavement had to be broken in order to raise the manholes and valves.

In the late afternoon, Erik and I measured cross sections and lengths of vee ditches for payment. A small crew was busy this afternoon cleaning up around drop inlets, which had gathered dirt and leaves and other debris.

Two more water leaks were discovered this date, one on Saddlehorn at Poco intersection and the other at Tumbleweed. Repairs would be made later, however.

On Wednesday, September twenty-ninth, we started out again in the cold morning, and it was windy, and a temperature of 33° at seven-thirty. The wind made it feel like zero. A backhoe was digging into the

pavement at the Saddlehorn Poco leak. The truck-mounted auger was again busy digging holes for street signs, but the places we had marked had been obliterated by the careless cleanup crew I [laughing]. These had to be remarked, guardrail posts were finally set, and the installation was completed—rail and all—before quitting time.

Wes Spohn had a crew continuing the work started yesterday, setting redwood erosion checks on cross-country sewer mains. I looked over yesterday's settings and found poor workmanship. Angles were incorrect, and some planks were buried too deep and others were too high. I had about seventy-five percent of them changed. Wes said he would watch them closely hereafter to see that they did the job correctly; he should have done that in the first place. I had gone with Wes whenever time would permit to stake out enough of the settings to help keep ahead of the crew. Altogether there were twenty-five such crosscountry lines, requiring a hundred and sixty-three redwood planks. I believe there were actually more than twenty-five, because near the end of the job we found two or three which had previously been overlooked.

The water leak at Saddlehorn and Poco was found while I was observing the excavation. It was a sheer break. The break was repaired, and the fifty-five feet of trench, which was dug to find the leak, was then properly backfilled. Finding these water leaks—it means bad news. You never know for sure just where the leak started; it may have been leaking for some time but had not yet reached the surface. For example, the actual leak might be fifteen or twenty or thirty feet from the point where the water showed up on the surface. That means, where they're crossing the roads, you've got to dig up a lot of work which was already done

and then patch it up, so it looks decent after you're through.

Patching with plant mix usually is left until later on for the surfacing, because later on when a three-eighths-inch mix has been ordered, that is usually the kind of mix you want for these patches. The mix with the larger rock where there're only small areas to patch, does not make such good appearance when it's finished.

The high temperature for this day was 44° and that was at two o'clock. And it dipped to 40° by four-fifty P.M. Snow started falling at four o'clock, intermittently at first, but steady from four-forty-five 'til five-thirty at quitting time.

There was no work Thursday on account of snow; however, I had made the trip to the job site and found most of the workmen had done the same. Four to five inches of snow covered the lower part of the Tahoe basin, and the depth at the job site was nearly six inches. Workmen were dismissed at eightthirty. I spent about another hour with Erik at his office, then left for home.

On Friday, October first, I arrived on the job site at seven-thirty, but I was having car trouble. I reported to Erik, stating that I should get the old Dodge into a repair shop this Friday, so I'd be able to use it Monday. Erik agreed, and as I remember, he said he would help, or keep an eye at least, on the Unit 4.

There was still considerable snow on the ground, and not all of the crewmen had made appearance, on account of slippery roads. The work that was done included the following: number one, clean dirt from around manholes and valves and several streets; number two, all manholes cleaned out; number three, repair made to another water line; number four, attempted to find another leak on Chiquita; five, dug out some of the rectangular electric power boxes.

On Monday, October fourth, I arrived on the job at sixfifty A.M., having managed to get the repair job on the Dodge completed on Friday and Saturday. Workmen on the job site (Roger Henry, assistant manager, and Doug Sherrot, foreman) were two operating engineers, running the loader and the backhoe, and thirteen laborers. (I knew there were a lot of laborers on the job at times, but in bad weather, they were usually dropped down to about eight, but when the weather was good, you'd find as many as fifteen on hand, sometimes.) Equipment, in addition to the backhoe and loader, included two compressors.

A number of the electric boxes installed last year did not match elevations at grade. These had to be dug out and raised. This date, a considerable amount of work was done on the boxes—handwork, that is. Raking down behind the dikes and cleanup of earth piles on the streets also continued.

It was found that the leak in the water main at Chiquita and Saddlehorn intersection was caused by a cracked valve, which should be replaced. I spent considerable time going over cross-country sewer lines Numbers 2, 3, 3A, and 4, checking with plans to determine the grades and placement points and the quantity of redwood planks required for erosion control. No planks had been placed on the lines referred to; however, I looked over line 5 and found the planks apparently had been placed, but two of them had been dug out and were laying on the top of the ground. The water stop at the top of line 5 should have been moved nearer the cleanout to better divert the water from the small draw. I would so recommend to Roger.

Tuesday, October fifth, a workman was assigned to me, and we spent one and a half hours staking erosion check points on lines 2, 3, 3A, and 4, which I had examined

yesterday. I showed Bill, the laborer, the way the water check planks should be firmly emplaced with about two inches projecting above the ground and with the planks set at slight angles to divert the water, alternating the angles so that water would not run in one direction only, thus leaving a gully. Staking was done according to the rules set for a given gradient or slope of the ground (these rules I have already described). Bill was a good workman and could be depended on to do the job properly, once he was given direction.

After leaving Bill, I found the crew with the backhoes filling around the manholes and sewer main on S-24. (S-24 is the name of line Number 24.) That was on the Tyner fill just above Woodridge. Backfill was pounded by backhoe bucket, in absence of a whacker, and that did a pretty fair job of compacting.

This was an unusually warm day for October. Ambient temperatures varied from 48° at eight-twenty in the morning to 66° at two-fifty P.M.

Three-eighths-inch plant mix was being placed around raised manholes. Temperatures of mix in the stockpile varied from 280° in the morning to 205° in the late afternoon. The portion of stockpile in the shade cooled, of course, much faster than the portion in the full sun. A three-yard loader would pick up the mix and transfer it to the raised manholes and valves and utility boxes, and a crew of four laborers were used to hand-place and rake the mix, which was placed around these structures. And it was compacted by a special roller— small roller, vibratory type. Some places where that could not be used, hand tampers were used. I spent some time in the afternoon working up charts for spacing erosion checks on sewer lines 10 to 24, inclusive. Then at three o'clock, Foreman Wes Spohn and the laborer assisted me in staking these sane lines. We finished at five-thirty P.M.

Wednesday morning at home between five and six in the morning, I prepared sheets on grades and corresponding numbers of redwood erosion checks for fourteen of the cross-country sewer mains. I did this so the men would have something for handy reference.

I arrived at the job site at seven-fifteen and found the ambient temperatures to be 43°, and at eleven-thirty, it had risen to 59°. Just after lunch, I was to take another reading, but accidentally broke the thermometer. I went with Wes Spohn and a laborer and finished staking the last five cross-country sewer lines.

Roger placed an order for additional redwood planks to finish the water stops, and they were to be delivered just as soon as possible. Crews divided the work, some placing erosion checks, and some raising manholes and valves, and others were on cleanup and asphalt patching. A private driveway adjoining Woodridge had been damaged by Shea's equipment. At the owner's request, we made the necessary repairs.

John Newman and a helper had finished backfill and compaction of the trench dug to find the water line leak up at Saddlehorn-Poco intersection. Quitting time today was five-thirty P.M.

Thursday's work crew consisted of Roger Henry, the assistant manager; Doug Sherrot; and Wes Spohn, the foreman; one operating engineer; and sixteen laborers. This was a fairly warm day, and you'd expect more laborers to come; they usually find the good alibis if it's too cold.

I started the morning by looking over erosion checks on three areas, where they were placed yesterday, and while I did not have time to cover it yesterday, I should have had. I was able to kick over all that one crew had placed on line 5. There were sixteen above Chiquita. I reported to Wes Spohn,

who should have checked the workmanship himself. He got the crew busy right away, and I stayed with him 'til all redwood planks were correctly placed and dirt compacted around them. Most of the other cross-country lines worked on yesterday had erosion checks properly placed, except for four on line 5; on line 6 also—that was the line between Fallen Leaf and Tyner. I had a discussion with Roger, and he said he would see to it that all future work on the cross-country lines would be done properly. He realized there would be no payment 'til inspection showed proper installation. I believe the trouble was too much hurry to get the job done because of a probable early approach of winter weather.

Final measurements were made by me on a ditch, which was rock lined, on the north side of the tire road off Mercury Court on Unit 5. I could not find Vic Clyde, who was inspecting on the job, nor Swede, the foreman. This ditch was substituted for the asphaltic dike shown on the plans, and I measured a length of 147 feet.

Using the wheel, I made final measurement of the dikes on Unit 4. The total length was 30,642 feet, plans showed a length of 26,800 feet. Now I called this 30,642 feet the final measurement; however, that is not so because the final measurement really should be made by both the contractor and the inspector, and that was done, as I will report later on. Plans showed (as I've already stated) much less than a 30,642 feet, but remember, I had marked a number of places which needed the checks, which were not on the plans. And this extra diking was made necessary for more complete, or more nearly complete protection. The overrun was thus about 14.34 percent. District Engineer Erik Beyer and the county approved this increase, as did Fodrin for Boise-cascade.

There will be an overrun also on Unit 5, and I was checking some of the dike work there when I found other places needing protection, which had no dikes according to plans. Thus I ordered more dike construction to overcome this apparent deficiency on Unit 5.

Friday, October eighth, was continued with the same crew members and equipment, and with work tasks much the same as those of the last several days. These tasks were blading on outside shoulders; concreting around monuments, signposts, rod holes, and a few other holes; placing erosion checks; and digging out the necessary water service boxes—that is, where it was necessary to dig those out, it was done. These water boxes are always placed at the property lines, and the future owner of the lot, then, can bring the line from the water box up to his house. That water box, of course, must consist of usually two or three or more boxes, so that the water connection down at the bottom of the box is thoroughly protected from frost. A number of these boxes—water boxes, as well as electric boxes—had not been placed at proper grade last year when that work was done.

The work on this project was pretty well scattered throughout, and melting snow had partly filled some of the holes dug for monuments; and that made mud holes. Of course, that had to be removed before setting the pipe in concrete forms.

Six storm drain manholes were found partly buried and were dug out and cleaned. John Newman said there were still twenty-four more electrical boxes to be dug out and raised to proper grade and concreted. Someone should have checked the grades—that is, the grade of the final paving—more closely when those were put in last year; but, of course, it was not done.

Workmen on the erosion controls finally were doing the job as it should be done. I

found no trouble on the day's work this time. The contractor was unable to get all the three-inch size erosion control redwoods that he needed, but he could purchase some two-by-twelves rather than three-by-twelves to finish out. I gave him permission to do so, as only a few more were needed.

October ninth was Saturday, but a small crew of one foreman with Wes Spohn, one operating engineer, and six laborers managed to place forms and pour concrete for four electric boxes; and one laborer was put to painting scored places on trees, which had been caused by contractors' equipment. Two laborers were working on holes bored for monuments, setting metal and forming for pouring the concrete.

Part of the time was spent by two of these laborers trying to find missing sewer service markers at the property lines. The redwood markers had been sometimes covered by earth, and in some cases also, had never been put in. The backhoe was used to try to find the end of the services, where these markers were missing. This had to be done with extreme care to avoid breaking the pipe if he dug too deeply.

Work ended at three-thirty P.M., making this an eighthour day, all on overtime. Neither Roger nor LeRoy were present this date.

Monday, October eleventh, was another long work day— eleven hours. The Gradeall started on lower Tyner recleaning the fill and placing rock at the toe of fill to help check erosion. The Gradeall operator also took soil tram "fat" places, which were loaded into trucks and hauled to "lean" places on the fill shoulders. This, of course, was done by the loader, which accompanied the Gradeall.

I went to discuss these operations with Erik. He decided to come out to the project, and he and Roger Henry and I looked over several water service boxes on the Matchless and Bronco areas, which were supposed to

have been taken care of. These were on fill sections to better serve the lots below the roads. They were placed without careful attention to proper grade. After subgrade was fine finished, these boxes were buried. The Gradeall carefully removed the surplus soil from near the boxes without damaging the boxes. Laborers then finished around the boxes by hand, and much of the final finish work was done these late fall days, and a lot more work had to do with the moving excess excavation from "fat" places and placing it in low areas on the shoulders.

Part of the fifteen-man labor crew was busy continuing the raising of manholes and cleanouts and valves. This seemed to be one of the daily tasks until that job was completed. This, of course, involved four operations every time a valve or manhole was raised. The first operation is digging the hole; the second operation in building up the structure to the surface with grade rings and what not; and the third operation is pouring concrete against the raised parts; and the fourth operation is placing and compacting the paving mix around the peripheral area to conform with the pavement and leave a good appearance. One detail, which I have already mentioned, has to do with keeping the metal covers even with, or very slightly below the paving level. Of course, as I've already mentioned, the snow plows could cause trouble if they're placed too high.

Ten of the twenty-four electric boxes remaining to be raised had the concrete poured today, and they were covered with Visqueen and then the soil placed over to protect from freezing until the initial set, at least, was complete. Work was finished for the day at six-thirty P.M.

On Tuesday, the twelfth, LeRoy DeMartin was back on the job. He and Roger Henry and Foreman Doug Sherrot ran the job with two

operating engineers, one oiler, one teamster, and twelve laborers. The Gradeall was again at work, this time between Rock Rose and Doeskin on Tyner Street.

There were four separate crews at work besides the Gradeall operation. Excavation and forming for concrete electric boxes required three men. One man was painting scored surfaces of trees. He said he had done this kind of work in New York state, when he was employed by a nursery man; he did seem to know what he was doing. Two laborers were busy raking and cleaning up along pavement shoulders. Another crew was busy checking sewer service markers at property lines.

Foreman Wes Spohn and a laborer Norman Eads left this morning to another job; I believe it was at Truckee. I may have to ask for Eads to return to help me check cross-country sewer service markers, as he was present when some of them were put in. There's always one put in at the location of each wye, which serves the sewer lines into the individual houses.

I made final check for completeness of erosion checks on cross-country sewer lines S-19, S-20, S-21, 21A, and 23. I also checked the six-inch line from Tyner just below the Second Creek crossing, and I followed it uphill to the cleanout. This line is a part of the altered or moved line, S-24, which is supposed to serve a future condominium above Tyner, and it is just northwest of Lariat.

Concrete for electric boxes arrived at eleven-fifteen, and the crew worked continuously through the lunch hour 'til the entire load was used up by two P.M. Four more boxes were poured in about a dozen monuments.

This particular copy of the day's diary is quite legible and is submitted for placement in the library for future reference.* Many of these carbon copies, which I've kept for my own

files, were very nearly—entirely—illegible due to use of poor carbon paper. For my oral descriptions I can use the brief notes I made in the pocket notebooks each working day. The official diary reports were made out at home—evenings—and from these pocket books, what I wrote down in the diaries was obtained.

October twelfth was a normal working day of ten hours, and October thirteenth and fourteenth were each ten-hour working days, with Roger Henry and Doug Sherrot running the show with two, sometimes three, operating engineers; one teamster; one oiler; and eleven laborers. Tasks were usual: raising electric boxes, cleanup by hand labor, continuing of bank and slope trimming by the Gradeall, and concreting electric boxes and monuments.

I started with Bill on Wednesday, checking sewer service markers but decided we should have some paint to make these type of markers definitely visible. Some lots may be without houses for ten years or more, thus the markers must still be visible at that time. I obtained the purchase order from Erik and bought two cans of yellow spray paint. We used all of it by two o'clock, so Bill obtained some white paint to finish the day's job. Bill continued painting the markers on Thursday. I could not spend much time with him, but would go over the cross-country lines to check his work later on.

Boise-Cascade had the grass-sowing truck on the job Thursday. It blew fertilizer, mixed with grass seed wood pulp on the cut slopes only. One fire hydrant adjacent to Lots 20 and 21 on Block 1 on the east leg of Tumbleweed was found to be unstable. Excavation showed that the concrete thrust block had never

*See Little papers, UNR Library

been poured. Excavation was left open for a concrete pour on the next trip of the concrete mixer truck. As I think I've stated before, the reason for pouring these thrust blocks—if you do not pour them when the water is turned on, the fireplug will chatter and probably bring the entire pipeline out with—.

Friday, October fifteenth, was a cold, cloudy day with intermittent snow flurries. I arrived at the contractor's office at seven A.M. Roger turned the distribution of the workmen over to Doug Sherrot and went with me and with the measuring wheel. We used Roger's car; Roger did the driving, and I held the door on the right side open with my foot, which allowed me to keep the wheel on the ground. We then check-measured all the dikes on the lower half of the project except on Dale and Alden courts. We had this done by nine A.M. about that time, Erik pulled up and delivered my paycheck. He told me he narrowly escaped being killed or severely injured yesterday in passing a slow-moving truck. The truck had a long, unflagged pipe protruding from its end. The pipe ran right through Erik's windshield on the jeep and barely missed his head. He was now leaving to have his windshield repaired.

Roger had to leave, so I continued the measurement checks with dikes alone. I did this with my own car on the long roads by fastening my left door open, driving slowly, using my right hand on the steering wheel, and holding the wheel on the pavement adjacent to the dikes with my left hand. When I came to the courts, I walked with the wheel. I also walked areas where equipment was operating or where other obstructions were in the roadway. I finished all the project by elevenforty A.M. and took the measurement figures to the office and asked that the girls add the items and type four copies, and also to make copies of my

report on the dikes, and to do this on the copying machine.

At three-thirty P.M. I joined Vic Clyde on Unit 5, and together, we measured all dikes on that project. I drove and Vic held the wheel. On courts, of course, the wheel was used on foot. We finished by five-ten P.M., and the figures would be added and copies made in the office on Monday. It was all right with Vic's contractor that we do the measuring—he didn't seem to think it necessary to ride in the car to check it. The totals for the two jobs taken by the two inspectors, Vic and me (with some help), on this date, October fifteenth, would be the final pay figures.

On Sunday, October seventeenth, I went over all the figures at home and found that Vic had missed adding the 593 feet on Apollo Way. The active pay quantities were thus as follows: dike on Unit 4, 30,574 feet; dike on Unit 5, 11,701 feet. On October five and six, Norman Eads of the Shea Construction Company obtained the following figures using the same measuring wheel: he obtained on dike Unit 4, 30,642 feet; dike on Unit 5, 11,640 feet. Thus Eads's figures were sixty-six feet more than the inspector's figures on Unit 4 and were sixty-one feet less than the inspector's figures on Unit 5. This made the total difference by five feet—practically even steven! [Laughing]—rather remarkable for the total distance measured!

There were overruns on both jobs, due to the extra dikes I had placed for extra protection. The original planned quantities were: dike for Unit 4, 26,800 and the dike for Unit 5, 9,600 feet. The overrun, thus, for Unit 4 was 14.15 percent and on Unit 5, 21.40 percent. These percentages differ from what I had equated before because these were the final pay quantities—measurements.

The crew on Unit 4 this date used twenty-four cubic yards of concrete, pouring boxes,

monuments, and doing patchwork on several places.

Monday, October eighteenth, the crews were assigned as follows: a backhoe with four men were busy raising electric boxes and forming them for concrete; a two-man crew was excavating the last two electric boxes requiring attention; another group, sometimes split up, were attending to miscellaneous jobs, such as filling holes around water services and placing riprap on steep cutbanks below the water boxes or sewer services. These were not experienced at laying riprap, and in absence of their foreman, I showed them that it was necessary to dig out the base of the area and place large stones in that excavation before going on up the grade with the other hand-placed stones; otherwise, the whole thing would fall down.

The way these men were doing the job certainly would not be effective during the snow melt in the spring; I had to keep reminding them of this. Doing these jobs on dry ground, everything looks different than it does when the real snow meltwaters come down off the hills.

The snow last week had melted enough to show up any "bird baths" in the roadway or the courts. It was a good time to make a "bird bath" survey. In general, there were only a few places which would need repair. One bad area on the northern side of Matchless Court next to the dike showed a "bird bath" about twenty-five feet long and about three feet wide and five inches deep at the deepest place. I can't understand (or don't remember) what I was doing or where I was when that pavement there was being poured. I must have missed it [laughing]! I decided the best way to care for this problem would be to cut the dike at the deepest part of the puddle and excavate a drain and pave it back of the dike to the edge of the court on the north side. This would

drain that "bird bath" without necessarily doing the repaving.

Another spot on Tyner just southeast of the drop inlet below the Second Creek crossing could be repaired by placing an asphaltic patch in the low spot. Antler Court, which had been a stockpile area for asphalt mix paving, had a preliminary floor prepared, which was made thicker by another layer of paving. Now after removing the stockpile, this was certainly not in perfect condition. There were a lot of shallow depressions. These shallow depressions were very minor, that's true; but they would make trouble, so they had to be patched. The intersection at Woodridge and Second Creek roads contained the low spots which I marked with keel; they will need asphalt patches.

I arrived at work at seven o'clock today and examined the concrete pours made yesterday and found the Visqueen cover, plus the soil on top, had served very well as protection from freezing. This was another cold, windy day. Some mortar—that is, cement and sand mix—was being used to repair rough spots, snake them smooth on the inside of recently concreted electric boxes. These also had to be covered to keep from freezing.

Cleanup of dirt and trash piles on pavement was about finished, but washing away the remaining dirt left by the hauling equipment was still to be done. Of course, this washing had to be done before any seal coat was put on,

Practically all openings in the pavement made by raising structures to the surface were now closed except for two electric boxes. Some "bird baths" were still to repair with hot mix, and two redwood planks which were missing in one of the cross-country sewer lines were put in place today.

Twenty-seven cubic yards of concrete was poured today, thus finishing concrete

work, except for three or four items. All 104 monuments had been poured and metal plates set. I was present when most of them were poured, but not all. I will make a complete inspection before recommending a final payment.

One crew continued working on water services, but much snore work will have to be done on this item. Bill Givens was to be on the job tomorrow to go over sewer services, which he inspected last year.

On Wednesday, October twentieth, I found the work force consisting of Roger Henry, who was the superintendent, and the foreman, Douglas Sherrot. There were two operating engineers and thirteen laborers. Bill Givens, who had been inspector last year, was present to check on sewer services. He found reference posts were not always in the right places, and some of them were not driven down soundly. Between Antler and Loma courts, a cross-country sewer line had settled. That, of course, would have to be dug up—or part of it—since it is extremely important to keep the downstream grade on all gravity flow lines. This line was later on dug up as far as was necessary, the soil was replaced to the right level, and the trench compacted, and the line reset, and everything brought up to grade as it should have been. There should be really no excuse for a settlement like that; the inspector should have seen to it when it was put in, that compaction was proper at the time the pipe was laid. Of course, it is necessary to compact those trenches on softer soil, or soil which does not contain hardpan or rock. They have to be compacted before the pipe is laid; otherwise, settlement can occur.

This was a partly cloudy and cool day, but the temperatures were pretty well above freezing. I found 44° at nine-thirty, which went up to 48° at ten-thirty, 52° at eleven-forty-five, 46° at two-forty-five, and 47° at

three-fifty. Work crews were doing the usual tasks—same thing as they were doing the last several days except that a load of plant mix surface arrived at three-thirty P.M. And six workmen placed the mix by hand around the finished electric boxes, filling a few holes mistakenly dug, and placing around a few of the rod holes, and filled a sixty-foot trench, which had been done looking for a water leak at intersection of Poco and Saddlehorn.

The mix ordered was three-eighths-inch maximum size, but three-quarters maximum was sent. This made a little trouble in handling it because the finish didn't look as smooth as it should. Temperatures of the mix, however, were good—around 275°—that's a good temperature for cold weather. Compaction of the mix was by hand tamper and by whacker; that was also good. Due to slowness of the patching operation, the mix was not all used until six-thirty P.M., making this an eleven-hour shift.

Thursday, October twenty-first, LeRoy DeMartin returned and all other crew who were present yesterday. A bitch pot was added, so that the cold surface of the paving around the holes at various structures could be tacked to better make bond with the new hot mix. This is especially important on cold days. The asphalt plant got the message correctly this day and sent the three-eighths-inch mix aggregate that they were supposed to have sent yesterday. It handled much more smoothly than the coarser mix. Two truckloads arrived at the same time, however; and in order to empty both trucks before the mix cooled, the patching crew worked through the noon hour, and they ate a late lunch around two. One more truckload arrived at three-forty-five, and all holes were filled but two by six-forty-five P.M. Part of the crew were filling spaces in behind dikes with dirt, and were refilling places where

settlement had taken place since the last storm.

Bill Givens was continuing his checking of the sewer services on the twenty-four cross-country lines, and he also checked some of the services at property lines, which would eventually send their output into the mains on the roadway. Bill found some recently placed stakes, which were supposed to replace missing ones, driven in the ground in the wrong places by workmen Bill and Norman [laughs]. That, of course, was done this year. These men were unfamiliar with the exact locations of the original stakes. Inspector Bill Givens relocated the stakes; he told me he had driven nails into trees to make many of the services visible or at least define where they were placed. He did this last year, but he was the only person who could find the nails again because the ordinary observer, not knowing where they were placed, it'd make too much of a task. A better way of marking would be to nail stakes to two trees and writing the distance to a service from each stake. Then when you want to find them next year or some other time, you simply need to cross two tapes one held from each tree, and where the crossing occurs, is the location of the service. A single nail or single stake does not do the job. Bill was the only person who could come anywhere near locating correct position of the missing markers, and we were not sure, of course, that he was doing that correctly. None of the crewmen now at work were present last year, nor was I.

Temperatures of freshly placed mix on the street were about 250°, and the temperature of the mix on the truck was 295° (there's always some loss in making the transfer). Again because of slowness due to so much hand labor in placing these patches, the last truck was not emptied until six-thirty P.M. The storm drain manholes, which had not yet

been dug out, were dug out and built up to the surface. Thus by next week, we should be ready for placing the seal coat and anything else that needed to be done on the surface.

Friday, October twenty-second, the backhoe, water truck, and all laborers worked only eight hours. It was necessary to get the seal on the pavement while ambient daytime temperatures were still sufficiently warm to do a good job. By all means, the pavement should not go through the winter without a seal coat, as it prevents penetration of water into tiny recesses or cracks. And water in these miniature openings, upon freezing, will expand and enlarge them, causing potential danger of surface water eventually working down into the base and subgrade.

You might ask, "What difference would that make?" Well, the answer has to do with expansion of some subgrade soils— not so much, however, with a well-graded base aggregate. If the subgrade becomes saturated in a certain spot and deep freezing occurs, the entire roadbed and surface mass in that particular spot will heave, causing a bump. When thawed, it will settle, and the paving will have multiple cracks and will have lost its integral adhesiveness. Rutting will then result, and a patching of hot mix will be necessary.

Now, on the lower half of this job, with the raising of structures up through the pavements with attendant filling and sealing around them was complete, and all pavement low spots had been patched—at least we thought so—and the whole pavement was ready to be thoroughly cleaned. All dust and dirt and pine needles and other extraneous debris, of course, has to be removed by broom and finally by washing.

Due to the lateness of the season, the cleaning crew encountered a real problem in the shady places. The recent storms had converted dirt and dust to mud, which

promptly froze during cold nights and remained frozen in the dense shade! [Laughs] The water trucks, by using copious quantities of water in such areas, finally succeeded in melting and removing the frozen mud. It is absolutely necessary to thoroughly cleanse pavement, so that the asphalt sealing fluid will adhere properly. After eight hours of quite intensive effort, the thirteen laborers and three managers and foreman and equipment operators succeeded in cleaning the entire paved areas—on the lower half, at least.

A truck and trailer loaded with SS-1 sealing compound arrived at three P.M. It was an asphaltic emulsion and could be thinned or diluted with water to proper consistency. The dilution ratio was supposed to be one-to-one, but the actual dilution was not accurate. The reason for doing that at the job site was one of economy, because it saved hauling extra water all the way from the freight terminal. However, later on they didn't bother to do that; they did the diluting at the freight terminal and hauled everything to the job.

The application rate for a seal coat without using a sand or chip cover is about a tenth of a gallon per square yard. This amount was presumed to be used here; some variation in the rate of application is to be expected due to imperfect control of the travel speed of the spreading vehicle. For example, he starts up grade suddenly, he'll slow down—he'll hit snore seal there than when he's going down the hill, unless he is very careful to try to control his speed.

The operator of the distributor (which was furnished by the oil company) was not noted for his proficiency; therefore, Roger, the manager, rode with him to hurry operations along. Spreading was started in the courts on the lower half of the job; however, as the afternoon was approaching evening, Roger decided to do the long roads, which hopefully

would enable the distributor to utilize all the material he had before nightfall. However, the last emulsion was not on the pavement 'til near eight-thirty P.M. This made a thirteen-hour work shift for some of us. [Laughs] For an old-timer I managed to survive those long shifts, but I really was in pretty good shape.

We all realized that the work done in some darkness would have to be well scrutinized in full daylight before acceptance. These observations would be made on the next work day, Monday, October twenty-fifth.

I was unable to leave Carson City until eight-fifteen Monday, the twenty-fifth, because of a run-down battery. I had a quick recharge, then made it to the job site at nine-ten. After spending three hours looking over Friday's seal coat and checking on today's work crews, I discovered snore car trouble. Again this was not my day. This time it was a bad brake and water pump. I managed to get the car over to Howard's Standard station at Kings Beach; where I lost two more hours 'til I could get a new pump installed—twenty-seven dollars. I was not happy with my car problems this week and through Monday. On Saturday I had a new carburetor installed in Carson City— one more item.

Work on the project did include distribution of transformer pads to the numerous power box locations. There were no overhead power lines, we must remember. This distribution was done by moving one at a time by means of a Case backhoe.

One labor crew was replacing broken water service boxes. These boxes had to be properly installed and backfilled around them, using earth delivered by the loader. The earth was sometimes hard to find, as I stated before, because of ecological rules.

One workman was using a compressor with a spade attachment, excavating a damaged paving area on Tumbleweed, where

a loader had broken down. I spent about three hours working up the potential punch list, which I showed Foreman Doug Sherrot. Items needing attention included further road work on two drains; and adjustment of several fire hydrants, including adding and compacting more fill around them; and redoing fills around a number of water boxes at property lines both above and below the roadway. I also called attention to a few low spots in pavement which were not yet patched. Most of these items were on the upper half of the job, which was not yet sealed. My actual time on the job was not more than six hours.

I arrived on time Tuesday, October twenty-six, and found that most of the labor crew was busy cleaning pine needles, cones, and other debris on the upper half of the job, and washing down the pavement, preparing for seal coat. The loader was filling behind some of the dikes which had not been fully protected. The backhoe was kept busy most the day finishing the job of moving those fifty-three transformer pads. And a truck and trailer load of SS-1 for seal coat arrived just before noon. It had been heated and diluted at the plant. It was heated to 200° Fahrenheit, which would make a great difference in application, especially in cold weather. The operator first covered the cul-de-sacs, which had not been done in the lower area. (Remember, we—to get done in time—emphasized the long roads down there [laughing].) He also covered some of the bad spots resulting from sealing in semidarkness on Friday. One workman was assigned to accompany the distributor truck; most of the cul-de-sacs on the upper portion of the job were sealed, as well as the principal roads. Any future sealing probably would be limited to patched or repaired areas.

The punch list required by Washoe County on the job was begun today. Erik Beyer, district engineer; Mel Fodrin, representing Boise-

Cascade; and several county engineers began at the top and covered Saddlehorn and its courts, then went down Tumbleweed, but did not finish this date, and I did not accompany them because I was plenty busy with seal coat. This was a normal ten-hour day.

I arrived one-half hour late at job site—sites, rather—on Wednesday, October twenty-seventh. All the electric clocks in Carson City were cut off during the night due to a three quarter-hour power failure. I didn't find out about it 'til later, although dawn did seem to some a little earlier than usual [laughing].

Roger Henry and Doug Sherrot, ten laborers, and two operating engineers with the backhoe, and another with a three and a half-yard loader were divided into two groups. One group was continuing on the backfill behind the dikes. Earth fill was obtained from the water tank excavation piles at Lariat Circle. Another smaller crew was using pry-bars to pry open all manholes and valve covers, rather than leaving that to be done by Erik and me when we were trying to do a final inspection [laughing]. And they were also doing little jobs to make better fits in the various kinds of structures.

Erik Beyer arrived about eight-fifteen, and we began our own punch lists, starting up on Saddlehorn. We found sewer service markers, supposedly corrected by Bill Givens, had in many cases been made from wood other than redwood; and some of them were so short, they could be easily removed from the ground. This was a case of inspecting the inspector's work. Water services inside the concrete boxes were in some cases so deep that it would be troublesome to make connection for future residences. Others were so shallow that they would be subject to freezing. These were all put in last year and supposedly okayed by the inspector at

that time. We also inspected manholes for cleanliness and flow grade. We covered all of Saddlehorn and some of the cross-country sewer lines. Erik had to leave at four P.M., so I observed the working until five P.M.

This was a miserable, cold day, which was on occasions pelleted with hard snow flurries. Erik thought there might be a work stoppage tomorrow on account of weather. He would give me a call at six-thirty A.M. Thursday to let me know.

Erik did phone at six-thirty next day, morning, stating that there were very light snows, and the contractor would work. I left immediately, but due to a slippery road, it took much more time than usual to reach the job site. Both Clear Creek grade and U.S. 50 and part of Route 28 were icy until I reached the intersection with the Tahoe Boulevard. From there on the road was slightly snow covered, but not especially slippery.

Both LeRoy and Roger were present this date, but Roger spent most of his time at office work. A three-man crew was placing stones—that is, dry rubble masonry—in the corrugated metal pipe inlet adjacent to the fire road which went off Lariat Circle; and a two-man crew was cleaning out drop inlets; others were setting transformer pads, a job they had started yesterday.

There's one thing I forgot to mention in giving this talk (or whatever you want to call it). Shea's crew, under the managers, were very careful about crewmen being injured. Of course everybody had to wear hard hats—that was a requirement. But certain mornings, I think about once every ten days, they would have the crew come early, and they would go through a safety drill. I did not attend these, but I knew what was going on, and I think that was an excellent idea.

Erik arrived around nine-thirty, and we started our punch list on the lower end of the

job; and we finished Lariat Circle by noon. It was a miserably cold day, so I decided to get a hot lunch at the state line. When Erik returned, we covered Woodridge and Tyner from Unit 2 to Doeskin Court. Erik left at five-ten; I stayed 'til five-thirty and found workmen at upper end of the job working on the punch list we made yesterday.

Friday, October twenty-ninth, I arrived at seven-thirty, and found one work crew working on our Saddlehorn punch list. They were doing a good job on the water services, raising low boxes, and adjusting yokes. A two-man crew with backhoe was placing transformer pads. I went back to Tyner about eight-forty, and Erik was already checking one of the cross-country sewer lines. We covered Tyner from Doeskin courts. It was very cold, and at ten-thirty we went for something hot. I had coffee, but Erik, being a good, faithful Mormon, had hot chocolate. Erik treated.

We finished the areas just mentioned by noon, and after lunch we covered Len Way, Boot Hill, Lantern, and part of Valley by four P.M. I left that time to make the Incline branch of the First National Bank before closing time. I returned, and we finished Valley. We found the same kind of trouble here, namely, with sewer service markers and with water service boxes. We also found manholes that needed cleaning. The plan for the next working day, November second, was to go to Vic Clyde's job and get him to help us with the final inspection work.

I joined activities Admission Day, which was celebrated on Saturday, October thirtieth, rather than on Sunday. I played with the Kerak Temple Shrine Band in the parade, went home to lunch, changed uniforms to the Reno Municipal Band outfit, and played in the concert at the old post office lawn at two-thirty. It was quite a cold day.

Sunday, October [thirty-]first, I dug gladiolas and tuberous begonias, bulbs, Peruvian daffodils, and tuberose. Went to Reno P.M. for dinner. There was no work Monday, so that gave me a chance to write up daily diaries for October twenty-seventh, twenty-eighth, and twenty-ninth.

On Tuesday, November second, Vic Clyde and I both arrived at job site a little before seven in the morning. I found my water hose leaking badly and the car steaming. I used my drinking water to fill the radiator and immediately took off to Howard's Standard Station at Kings Beach, where [the] attendant drained what was left of my antifreeze, replaced the old line with a new one, and enough new antifreeze solution to protect the old Dodge to twenty degrees below zero.

I returned to the job and found Vic and Erik, also Bill Givens, whom Erik had called back to the job—there were plenty of reasons why [laughs]. Erik assigned Vic to stay with Bill and see to it that the punch list items were taken care of. Erik and I started on Saddlehorn and covered adjoining courts and cross-country easements in the vicinity also. Erik had worked Monday on punch list and had continued on Tumbleweed and some of the adjoining easements. Erik gave copies of the punch list to the contractor and to the inspectors.

Vic and Bill Givens—they finished the sewer service markers on Saddlehorn by three P.M. and started on the westerly side of Tumbleweed. We had the contractor use a three-man team to set redwood markers for these sewer services.

Bill Givens was called away about four-forty-five, and I stayed on 'til five P.M.—that is, I observed the workmen setting the markers.

On Wednesday, November third, Erik asked me to stay with Bill Givens. I believe Vic Clyde had some checking to do on Unit 5. I stayed with Bill most of the morning checking sewer service markers on north and east sides of Tumbleweed Circle and courts, Pinto, Fallen Leaf, and Antler. Just before noon we had the backhoe help us find missing sewer service markers on lower Saddlehorn. Bill said in one case a marker which was showing was in the wrong place. Excavation by backhoe found the service twenty feet from where the marker had been set last year.

A load of three-eighths-inch patching mix arrived in the afternoon. This load was to be used in part to patch a drain ditch and to repair a damaged dike on Matchless. Another repair job was on Fallen Leaf to repair a section of the paving, which had been inadvertently dug out. I observed this patching from four-thirty 'til dark, having spent most of the afternoon with Bill Givens checking sewer service markers.

Bill and I finished the checking on Tyner, Lariat, Woodridge, and Doeskin, and Rock Rose, Len, Valley, Boot Hill, and Lantern courts. Vic Clyde was present on Unit 4 part of the day and watched patching on several of the places.

Thursday, November fourth, was spent by the contractor's crew working principally on punch list items, cleaning manholes, resetting water service boxes, cleaning of loose brush and debris, resulting from contractors' operations along cross-country trenching and adjacent to the highway. I spent the morning checking Saddlehorn and adjoining courts to see that a backhoe crew had set redwood two-by-fours where Bill Givens and I placed markers. I found seven places they had missed. I spent the afternoon doing the same thing on Tumbleweed, its courts, and a few additional courts. Erik Beyer was busy

finishing the punch list on Spencer, Alden, and Dale courts, and on Second Street, and Knotty Pine. Vic Clyde stayed with the crews on the punch list.

Friday, November fifth, all workmen with their super visors were busy with punch list items. That was on Unit 4, on which I was working, but Units 4 and 5 were worked together, because the contractor on Unit 4 was on Unit 5 as a subcontractor so much that those jobs had to be handled together; Vic Clyde was in on this (of course, he was the inspector).

Bill Givens, who was one of the inspectors on Unit 4, was given a three-man crew and the backhoe to aid in resetting service markers and driving the missing ones. These service markers must be placed in such a way the property owner will know where he can connect with the sewer. And the markers are usually redwood stakes about four feet long, and they're usually driven down with a backhoe bucket—just simply pushing them into the soil. Apparently this had not been done, and I still don't know how Bill Givens knew where he put them down, because he was there, no doubt, when they were put in. His memory must have been awfully good because I certainly—when I followed him around, I certainly didn't know whether he was in the right place or not! Then, there were markers, of course, placed on easements going across country, and these markers, too, had not all been put in; but Bill seemed to think at least that he was putting them in the right place—I would not guarantee it personally.

Vic and I were both on these jobs; Vic stayed with the main crew on punch lists, and I stayed all day, except a short time I spent with Erik Beyer discussing the final appearance of Second Creek just below Tyner. That area needed some additional work to be acceptable, according to my thinking.

I found that Bill Givens had replaced the short stakes on the easements with four-footers—all redwood. He apparently had marked some of them with temporary short stakes, and those were visible. We covered as many as eight of the easements. Just before noon I took Bill on a section of Tyner and showed him where the backhoe crew missed several short, nonredwood service markers. Bill made corrections.

We went back to easements 'til it was almost dark at fivethirty, which was the regular quitting time. There were several water lines on easements which needed erosion checks (by that I'm talking about water lines down through steep country on easements. That ground had to be dug up and trenched to put the lines in, but the dirt, even though it's compacted, put back over the pipe, is very much subject to erosion on steep hillsides. So the redwood three-by-twelves—usually ten feet long—had to be put in one after the other, and there's certain rules how closely this should be spaced. If they're very steep, They may be spaced as close together as twelve or fifteen feet. If it's not too steep, it may be spaced as much as twenty, twenty-five, or even thirty feet apart. I believe I've explained this before, but I'd like to have it made clear why those erosion checks must be put in— and of course, they're made of redwood because redwood is known to be probably the least susceptible to rotting of all kinds of timber). I was ready to make the stakeout on these erosion checks this date, but Roger, the assistant manager, wanted to discuss the matter with Erik Beyer before proceeding.

On Monday, the eighth, I started at seven o'clock in the morning, again with Bill Givens's crew, but without a backhoe. We began work on Tyner, where we left off Friday; then we turned to easements, continued the punch

lists relating to redwood stakes on lines 9, 9-A, 9-B, then on lines S-6, S-7, S-8, and S-22. We then finished punch list on S-1 and S-2 by lunch time.

In the afternoon we covered sewer services on several courts, but found places we could not finish without the backhoe. This meant we would have to come back to these areas once more. According to LeRoy, the manager, placing of guideposts probably would take place tomorrow.

Tuesday, November ninth, was a long day, but the weather was pleasant. Workmen were on the job at daybreak—earlier than seven o'clock. A single water service for Lot 61, Block F on Fallen Leaf had not been put in the right place last year. Surveyors had made an error in measuring, so that Lot 62 had two services and Lot 61 had none. These services must be either on the property division line or inside the boundary of the lot for which each one is intended. Usually it's easier to put them side-by-side on the property line.

A new service was put in the correct place, but the contractor did not bother to dig out and remove the misplaced one. But it was cut and plugged, therefore, was not visible. There was, of course, no payment for the correctly placed service.

Bill Givens was still with a crew of laborers—this time with the backhoe—working on replacing sewer service markers or hunting for missing ones. Vic Clyde was still with the punch list crew making a variety of corrections.

On Knotty Pine there had been some digging done—I believe it was for replacing leaking water pipes. The trench had to be refilled, and the trench portion in the roadway had to be repaved. A load of three-eighths-inch maximum size plant surface was ordered to do the patching, but it arrived in mid-afternoon, which resulted in a finish

time at six o'clock in the evening. I watched as much of the patching as I could, but I had to stake out water line Number One below Pinto Court for eleven erosion checks, so I had to run from one place to the other. It was somewhat of a task.

I also went with Roger to check on location of guideposts. We decided to omit the posts on widened areas on Saddlehorn and Chico, as they were well diked. There were seven of the fifty-four guideposts which would have been extra, but we found places on Dale Court where they were needed at the edge of the steep and dangerous fill bank. Roger and I also marked places for three redwood erosion checks, requested by Erik to be placed on a steep, single sewer service line for Lot 42, Block E, above Knotty Pine. This long working day ended at six P.M., when the last of the patching was unloaded, utilized, and compacted.

The weather on Wednesday, November tenth, changed from fair to cloudy by afternoon. My first observation upon arriving at seven o'clock was related to condition of the patching we did in semidarkness [laughing] late yesterday. These particular patches could have stood some improvement, and such was done later in the day.

Most of my time was spent with Bill Givens measuring rock-lined vee ditches. Sometimes the drain ditches must be rocklined, especially in the steep areas; otherwise, erosion would cause gullies. And these rock lined vee ditches rate a special pavement per linear foot or sometimes by square footage. So when the punch list is being completed, payment quantities must also be computed; so measurements have to be taken.

We also measured the best way we could, the rock basins of inlet and outlets of corrugated metal pipes. The down end of a metal pipe or drains, the water may drop at

the end of the pipe several feet under the soil. Unless rock is put around that, more gullying or erosion could take place; therefore, quite a few of those areas were built up with rock to prevent erosion. The measuring of them was quite a chore because there were never flat surfaces; they were at all kinds of angles and curves. We did the best we could, and I think Erik agreed that what we did was as good as he could do, so we got by. A lot of the times we had to make an estimate rather than an accurate measurement!

The seven vee ditches varied in length from 50 feet to 975 feet. The total length was 2,865 feet. There were some pretty rough places, and their measurements—this is not easy [laughing]! Total for rock-lined basins would be shown after the remaining unmeasured ones were accounted for.

Vic Clyde was with the punch list crew all day. He found the manhole below Parcel A, which had to be raised. All guideposts were in place but still had the reflectors to be inserted. Of course, [when] you're driving that at night, the reflector must be on the guidepost because the post alone may not give you enough indication of danger.

We found debarked trees had not yet been painted on cross-country lines 3, 3-A, and 4. This has to be done, of course, as a matter of ecology.

The measurements of rock-lined vee ditches taken this date are not the totals for the job. There were others previously measured and recorded.

On the eleventh, Thursday, there was no equipment on the job, as the backhoe operator was ill. LeRoy DeMartin and Roger Henry and Doug Sherrot were present with six laborers, as I recall. Vic Clyde was with Sherrot and the laborers all day on punch list items. These bosses, in many cases, get right out with pick and shovel and do as much work

as some of the men, especially when they're in a hurry to finish something or to get it on the pay list.

Bill Givens and I were to continue measuring the volumes (that is, cubic yardage) of rock at corrugated metal pipe inlet and outlet basins. Rock sometimes is placed at the inlet and in the bad soil. Bill, however, was called away after we had taken measurements of only one outlet at Second Creek crossing.

Intermittent rain showers occurred all day; this gave me an opportunity to look for possible "bird baths" which might not have been noticed without the rain. The rain furnished a good volume of water, and I found three "bird baths," two of which were puddles forty feet or better long but not over three feet wide. I marked the places for future patching. (We do that, of course, with keel—with either yellow or red keel. You certainly can't use black keel on the black paving.) I marked the places as well as I could; then when Bill returned, we continued with our rock basin measurements. The grand total of all such measurements for pay quantity was 7,402.5 cubic feet or 274.17 cubic yards.

Tyner, the longest street, was crossed by the most corrugated metal pipe drains. This street alone had better than sixty-five hundred cubic feet of rock at inlet and outlets. Other streets which contained such structures were Chico, Saddlehorn, Tumbleweed, Fallen Leaf, Antler, Valley, Second Creek Drive, and Knotty Pine. These streets, however, individually, had only minor amounts.

Additional pay items listed this date were twenty-three street markers and fifty-four guideposts with reflectors. All street signs and guideposts were satisfactory except a signpost at Woodridge and Second Creek, which read, "Woodridge and Creek." LeRoy said he will replace with a proper sign.

Friday, November twelfth, was a cold, cloudy day with periodic snow, plus icy roads and highways. The backhoe operator was on the job with his hoe this date, and he and the laborers continued filling around water service boxes and doing some cleanup; however, partly frozen ground certainly could not be handled perfectly. Most attention was given to water services along the steep cut banks on Valley. Compaction of the soil and rock, which had been placed, was done by pounding with the backhoe bucket. This was no more than a temporary measure to hopefully hold through the winter. Further work would have to be done next spring.

This date the water lines were drained from the ValleyTyner intersection to Unit 2, also Woodridge, lower Tyner on a westerly end, and the cul-de-sacs, Doeskin, Rock Rose, as well as Lariat Circle. After draining, they were refilled with strongly chlorinated water and let stand over the weekend to disinfect all the lines. Three gallons of chlorine were used per four thousand gallons of water in the water truck to make certain sterilization would be complete.

The first thing done Monday morning, November fifteenth, was to drain off the chlorinated water from the lines filled Friday. The empty lines were then flushed with water only— from Unit 2 and from lower Woodridge and Alden. After thorough flushing, the lines were allowed to fill. Care was used to be sure and open fire hydrants at high points to remove air. The hydrants were closed progressively uphill, as air was replaced by water. However, one or two of the lower hydrants had been missed temporarily, which resulted in flooding below Doeskin and Rock Rose courts. The water flooded down over a buried pipeline, protected from natural erosion by redwoods. However, the sudden flood of water made a mess alongside two

residences. Erik Beyer was on the job giving directions, and after all water lines were in order, some refilling and compacting was necessary in the flooded area.

Contractor's crew consisted of the two managers and the foreman and one laborer. I spent most of the day with laborer, Ray Para, opening and closing hydrants and valves. This was a nine and a half-hour shift.

Tuesday, November sixteenth, was the last working day on Unit 4 in 1971. It turned unusually icy on all pavements at higher elevations. Only the three bosses represented the contractor's crew, and their time was spent at office work. They did not arrive 'til eight o'clock, and I had covered the entire icy job, trying to find where operations, if any, were under way but found none.

Erik Beyer arrived shortly after eight o'clock and in company with Roger and me, observed behavior of the water pressure reducing stations. Erik and Roger took a water sample from the upper part of the main, and I delivered it to the sewer plant, where tests were to be made for the chlorine content. The last five hundred feet of Slate Water Road leading to the sewer plant was completely iced over; I could not make it with the car. I thus finished the delivery on foot. Dave Pond, who was now working at the sewer plant— was formerly an inspector on these jobs, was making the tests. He found the sample chlorine free.

There were a number of small items on the Unit 4 project which would have to be taken care of in 1972. This three- or four-hour period this date ended the day's shift for me, and I arrived home at around noon. Thus I was finished with my share of responsibility on the Incline projects. I enjoyed the work, the contacts with their people, and in particular, the *wunderschön* surroundings in which to do the work— *wunderschön* I like that word

because we don't have a word of its equivalent, one single word, in English— *wunderschön*.

I must next give brief biographies of two of my ex-Carson High School students who were inspectors on this job. I would do the same for Bill Givens, one of the inspectors, but have been unable to contact him. I believe he lives over in California somewhere.

Vic Clyde and Mel Fodrin were both students of mine, and I believe they graduated about the same year—I think it was 1928. And I also had Mel's sister, Rose, in high school. But turning to Vic, I remember him as one of my best students. He was in my classes for four years. He took math (I think he took all the math that was given in high school, and I was teaching all of it), and he probably took both chemistry and physics—I don't remember, but I taught both of those subjects, one one year and one the next. But Vic, to the best of my knowledge, never missed a problem. He certainly had a mathematical brain.

Vic had one sister, Violet, and one brother, Joe. I had neither Violet nor Joe in school. Violet had a mental problem she did not finish school. Vic's brother, Joe, was younger, and although he finished, I did not have him in my classes.

But when I first came to Carson City in 1924, I thought I'd better get into some church work (I think I've mentioned this), and of course, Bonny Reid, the Methodist Sunday school superintendent, roped me in as a Sunday school teacher. And as I have said before, I got busy and read the Bible as fast as I could, and I had a Sunday school class, and Vic was one of the members of it as a smaller boy. [Laughs] I didn't last very long, though, as a Sunday school teacher!

Vic was born in Ashley, North Dakota. His father had been the county superintendent of schools there, and he had run *his* father's—that is, Vic's grandfather's—newspaper.

The Clyde family moved to Carson City in September of 1923, and Mr. [Elbert T.] Clyde took a lease on the Carson City News, which was a daily. But he closed his paper in 1932 and went out of business.

Vic graduated from the eighth grade and high school, both in Carson City, and he took one year at the University of Nevada. He worked in the field with the location engineer, who happened to be [Wayne] "Red" McLeod at that time, and Vic told me that he learned more about surveying from Red McLeod than from anyone else. Red McLeod, by the way, at one time held the office of state surveyor-general.

Vic went into the Carson office—I believe he was in the drafting room—in 1930 and '32, and he went back out into the field until 1960. He was made a resident engineer. He did very well as a resident engineer. I visited his jobs many times on account of material problems. Some of the bigger jobs he handled was the Painted Rock area down the canyon on Interstate 80, and he had a good-size job north of Wells, and he also had the west side of Pequop Summit in Elko County on the interstate. He had also a number of jobs on secondary roads.

Vic and Judy, his wife, were married in 1940. They had no children of their own but adopted two boys. The boys went to college. And one of them finished with his master's degree, and the other had three years at the University of Nevada and also in the community college.

In 1960, Vic was appointed as the chief construction engineer. He held that job for three years. It was quite a demanding job, and at that time the chief maintenance engineer job was open, and Vic decided he would rather have that job, and he was given the job as chief maintenance engineer. He retired from that in 1971.

Vic had done some private work here and there, but I believe the first he had done was on this Unit 4 at Incline. Later on when I was doing special work for John Isbell on developing material sites, Vic was hired by John—Vic and another Highway Department retiree, “Brownie” we called him. I’ve forgotten just what his first name was; we always called him “Brownie.” They did some surveying. Then in 1973-74, when Erik Beyer was made chief of the construction on the Round Hill to Glenbrook sewer main, Vic was one of the men he had for inspector. As a matter of fact, Erik—I think I was the first one chosen, and I helped him get at least two others. One was Vic, and the other happened to be Mel Fodrin, Mel coming in later.

Vic’s hobbies have been fishing and hiking and hunting. He and his wife’ve both gone out on camping trips and hiking trips. He liked to fish the upper reaches of the east Carson River, an area that I enjoyed. I fished there many times, but never with Vic.

Mrs. Clyde, Vic’s mother, after Mr. Clyde’s death, ran a boarding house at the Clyde home, and she did that for many years. Mrs. Little’s father, Mr. Fairley, after his wife died, boarded there for a time with the Clydes.

Mr. Clyde was a member of the Odd Fellows, and he took quite an interest in Odd Fellows work; and he was one of the instigators of dedicating and setting aside a special area on Carson Pass (Route 28, California). Some Odd Fellows had come through there in the early days and had left their names and certain objects which were dear to an Odd Fellow’s heart, and that area now has been set aside as a kind of Odd Fellows marker—historical marker. Mr. Clyde had a lot to do with that. This particular band of emigrants were mainly Odd Fellows, and they left all their names

and an account of their trip. This is just a few hundred feet southerly from the summit. By stopping at the summit just barely on the westerly side, there’s a trail (I believe it is marked); which leads up to the Odd Fellows monument.

So much for Vic; Vic is still in Carson City at the present time. I don’t believe he’s doing any more than I am doing, although he does go out on’ a survey every once in a while.

Now to tell something about Melvin Fodrin. He was one of my high school students, as I’ve said before—1924 to 1928. He took math and science, and he and Vic were in the same graduating class. But after Mel graduated, he took some graduate work. He wanted to become a Naval officer and attend Annapolis. I helped him in some of my spare time with math review, but he missed a passing grade by a very small amount. Later he attended the University of Nevada for two years.

Mel’s father [Jacob P.] (Pete Fodrin, as we called him) was an official in the state court, I believe, for quite a few years. His mother was a member of the PTA; I remember I used to have to attend those PTA meetings years ago when I was teaching. Lucky coach didn’t have to bother with it, but here I was with all those women, and believe it or not, I was made vice-president of the PTA, which is also a member of the women’s some-kind-of-association.* So I had a rather peculiar job; I think I’ve told you about that [laughs].

Mel’s mother was a native of Virginia City, and I think his dad was an accountant (I believe that was his vocation) and that he started out (that is, Mel’s father) with the Southern Pacific Railroad in Sparks. And, as

*Nevada Federation of Women’s Clubs

I mentioned, he was an official for years in United States Court in Carson City.

Mel's uncle, Dan Fodrin, was for many years mayor of the city of Sparks. Mel was born in Sparks, as a matter of fact, in 1910, and he had two sisters, Rose and Betty. As I've mentioned before, Rose was in my classes. I had one class for four years, starting in 1925, and they graduated in '29. Rose was in that graduating class; I was their sponsor. Rose was also my pianist in our little high school orchestra. Betty was younger, and was not in my classes.

The Fodrins moved to Carson City in 1918. Mel tells me that he started the second grade in Carson City that year, and he and Swede Russell—Grover Russell—who is now a retired brigadier general, was his pal.

Mel worked for the Highway Department with Lester Hancock on the state Highway survey crew in 1928, and after spending two years in the University of Nevada, started in the main drafting room with the Highway Department, but he left and went on field work at Baker, which is one of the most isolated places in the state, over in eastern Nevada [laughing]. He worked there under Zeb Turner, who was the resident engineer.

Mel took a ten-month job with United States engineers at Skamokawa, Washington [laughing] as a plane table operator the following year, after which he returned to Nevada Highway Department as a draftsman in the main office at Carson City. He was soon advanced to assistant chief draftsman under Frank Lyman, the chief draftsman, but went into the service in World War II and served in United States Navy Seabees, and finished as lieutenant commander.

Mel, as well as his father, Pete, have both served as masters of Carson Lodge Number One. Mel also became High Priest of the Royal Arch Masons. As a matter of fact, he

was a Mason before I was, and he assisted in conferring on me one of the degrees—I've forgotten which one.

After returning from World War II, he resumed duties as an assistant chief draftsman in the Highway Department and was advanced to chief of the secondary road design section. He retired from the Highway Department in 1970 after thirty-eight years of service and immediately went into private engineering work. He accepted a position as field correlator for Boise-Cascade projects at the Incline area. I worked with Mel on mutual problems in this area. Later in 1974, he was hired by Erik Beyer as an inspector on the Round Hill to Glenbrook sewer installation.

During the last two years, Mel worked on engineering projects in Washoe County. The Mayberry bridge over the Truckee River below Verdi was completely demolished. It was posted for years for five-ton load limits, but a twelve-ton truckload of strawberries tried out this bridge and completely demolished it and wrecked the truck and the cargo. Mel tells me, after the first section tumbled, he managed to work a little farther and got another section, and he just barely got out of that one and clobbered the last part of the bridge—all three parts of it. This bridge, of course, had to be redesigned, and it was redesigned and rebuilt by Washoe County. And not only the bridge, but they made a one and a half-mile paved road leading to it, plus an underpass under the Southern Pacific Railroad, and the cost was about one and a half million dollars. This was done over the objection of about a dozen families who lived nearby; they wanted to continue in peace and quiet without living on a semimain highway [laughs]. Nevertheless, they now have a better bridge, regardless of their thoughts.

Mel's hobbies have been skiing and tennis. He also has been coach and instructor of

tennis and ski teams and has done work as a leader with both Boy and Girl Scouts. He also has taught swimming, first aid, and lifesaving. Mel has been married three times and has three daughters by his second wife. His first wife, Doris Johnson, was one of my students and a member of the graduating class of 1929. I was the sponsor of that particular fine class, and I enjoyed every minute of it. I did not know Mel's second wife. His third wife, Thelma, was a widow with one daughter. Thelma has worked as a receptionist at the main Highway Department office for many years and is still employed there at the present time.

Mel recently has had some trouble with his eyes. He has had a cataract removed, and he had that done here in Carson by Dr. Spector, and I believe he still has some trouble. (He and Mrs. Little get together conversing about their respective eye operations every now and then.)

RETIREMENT CAREER II: INSPECTIONS IN CARSON CITY AND DOUGLAS COUNTY

I don't always keep notes on all personal happenings in our lives, but, as I recall, we went down to Stockton at Thanksgiving time and visited two of our daughters and their families. And the one family of our Number Two daughter, we call her—Joan Remington—. Well, Joan's husband is a reporter for the *Stockton Record*, but he's also a good cook; and he is always the chief turkey roaster, and he does a good job, regardless of what he's roasting. The other family, Pickerings— the oldest daughter is Moss Pickering, and her husband is quite a cook's helper, but he doesn't prepare the main dishes. But anyway, we had a Thanksgiving dinner together and an enjoyable time, except that the old Dodge had some problems, and I had to get a new battery and a few more things. So after that was done, we returned home. And I don't recall just what we did for Christmas, but I think we spent Christmas Eve with Bob Arkell and Mrs. Arkell and with other people, and we had a nice time up there.

Come first part of the year [1972], we went back down to Stockton for a holiday

with the kids, and had nothing to do but go up to Ben and Joan's cabin, which is located about a half a mile from the main hotel up there at Bear Valley. Well, we went up in a snowstorm, and by the time we got to Bear Valley, the snow was around four feet deep. Of course, the roads were open, but Ben and Joan's cabin was practically out of sight in the snow. So the women and the kids were left up at the hotel. So there we all were.

So Ben and I went back to the cabin, and we managed to get up to the cabin on snowshoes and got inside and got a fire built. Then the next problem was getting the family there. Of course, the kids were used to using snowshoes and away they went. But Ruth (Mrs. Little) had one beautiful time getting up there, but she finally made it. I don't particularly care about too much snow, but nevertheless, there it was.

The following day all the kids in the family and the menfolk except me, had to go skiing. Well, I got the snow shovel and tried to uncover that forty feet of porch they've got around that cabin—it doesn't have a roof over

it—but I needed to take the great big drift off, so we could see out the window [laughing]. And I worked most of the day with the snow shovel; I don't think I got too tired, but it may have had some influence on what happened to me later on.

At any rate, we returned to Carson. The weather was cold up at Carson, and the snow was about a foot deep at the time we got home. I made a note on the eleventh of January about some car trouble I had. I took the car over to Weinstock's auto center at Reno and got new balls in the front wheel joints and a new starting device, and a new sidearms line for the old wheels, and was told that the front brakes needed attention, and the front tire was bad; so I think I got by pretty well for sixty-seven dollars.

The next thing which I made a note in the little notebook which I carry—and fortunately, I've written quite a few notes there—was that Mrs. Glass called on the morning of the thirteenth, and we agreed to resume the autobiography Wednesday, January nineteenth. I told her I was having a little trouble getting oriented in regard to the place where we left off last April. As a matter of fact, I believe this autobiography was not resumed until about three years later! [Laughs]

On January fourteenth, Ruth had gone to Reno to some affair with one of her lady friends, and about four-thirty P.M. I finished reading the paper and got up out of the chair and fell flat on the floor. I was not in pain, but I was frightened. I thought I'd had a stroke, yet I was not ailing anywhere except that I could not control my leg muscles at all and could not get up off the floor, and I seemed to have the shakes. But I managed to wiggle my way to the bathroom, then to the bedroom, and got into the bed. And Ruth found out about it when she got home, and said she would get

me up to the hospital the first thing the next morning.

Bud Hill, our neighbor, helped Ruth get me into the car, and we went to the hospital. At the time Ruth left me in the hospital, on the way home as she was driving, she noticed for the first time that she had some kind of trouble with her right eye; so we were both at the beginning of a little trouble. As a matter of fact, we got well acquainted with doctors and hospitals for the next several weeks.

I was admitted to the Carson hospital. I had no particular doctor, except that I had had Dr. King do some emergency work on me, so I took whoever happened to be there; it happened to be Dr. [James C.] Fulper. I had the shakes and fever, so they put me to bed and began tests, which lasted four days. I don't remember all the tests, but I do know I had chest x-rays, kidney x-rays, and after clearing the alimentary canal, I was filled with barium hydroxide, and they took some fluoroscope studies. No one could tell me what I had. I did have a fever, more or less. And the following day after that, I had to swallow nine dye pills for gall bladder trouble. (I know recounting these things is probably just tiresome reading to most people, but I'm going to do it, nevertheless.) And I had many blood tests and electrocardiogram. And then they began to give me dope for flu. So I had nine temperatures, nine breath counts, and nine blood pressures taken every day through noon, January twentythird.

Finally, Fulper decided the diagnosis would be a virus pneumonia, which originated as a virus which had affected my nervous system. I think that was as good an answer as any because I did have pneumonia. There was no detrimental reactions for any of the tests. They were all one hundred percent negative. But they were better than six hundred dollars worth!

I was released from the hospital in “no better, no worse” condition at about eleven P.M. January twenty-third, and I was supposed to recuperate at home with plenty of rest and plenty of liquids, temperatures to be taken daily, and reported back to the doctor, Fulper, frequently. My daughter, Joan Remington, came up from Stockton January eighteenth and stayed ’til January twenty-fourth; she was a great help and comfort to Ruth and me.

So, I was on the daily pills and with temperature taken, and that kept up quite awhile. The pill schedule—I’ve made a note of that—[laughs] the yellows were taken at seven, eleven, three, and seven o’clock in the evening; the reds were taken at seven in the morning and seven in the evening, the reds were taken at seven in the morning, eleven, three, and seven in the afternoon—so I was really fed the pills. I do not know what they were nor in particular why they were given, but I seemed to gradually improve, and my temperature went down and was finally about normal around the twenty-eighth; and I was up and around some. However, John Isbell, for whom I had done some private work, came in one of those days and wanted me to go out to look at a volcanic material between Dayton and Silver Springs for possibility of a lightweight aggregate, but I told John I was in no condition to go.

We had some problems to settle with Ruth, so she had a chance to go see Dr. [William I.] Spector (I’ve forgotten that date, and I don’t seem to have a note of it here, but Dr. Spector’s an eye specialist, a surgeon), and she found out that she had a cataract on her left eye, which needed attention.

Things went along ’til about February eighteenth, and I woke up that morning, and the muscle in my right arm, the main muscle, was all in one big bulge right at the elbow, and

I was really frightened. There was no pain, so I went up and saw Dr. Fulper, and he said, “You get over and see Dr. [William R.] King. Something has happened to that muscle.” I agreed with him that it had.

So I had an appointment with Dr. King, and he operated on that arm. I’ve forgotten just when he did the operation, but at any event, he found that the tendon was stretched out about six inches long; and why that happened, while I was simply resting at home recuperating and not doing anything exciting, was a little bit hard to determine. However, when I look back over the history of my life, I had some bad things happen to that arm. I used to pitch baseball when I was going to college. Of course, in the wintertime in the Gunnison country when it’s cold, there was no baseball; there was no exercise. But when I got home for a semester vacation (maybe it was a quarter vacation), Dad told me to hitch up the old black mares to the sled and go out and move that six-ton hay in the field and bring it in and stack it in the old shed, which I did. But that right arm was pretty soft, and when you lift bales weighing from ninety to a hundred and ten pounds and stack them five high, that last stack when your right arm is at the end of the bale and pushing it up [gesture pushing over head] and you do that all day long, it does something to your arm. And I know it did something to mine because for a good many weeks I was unable to throw a rock even, let alone a ball. It slowly healed. And later when the kids were very small, I fell out of an apple tree that was pruned and landed on that arm, which didn’t help it. And then in 1969, I helped a workman up at Incline, who was all alone trying to load a three hundredpound whacker in a pickup, and I helped him do that, and I felt something sort of give. So I think I have the causes diagnosed.

On March third, Ruth had an appointment for a possible future cataract removal by Dr. Spector. I thought I was all through with hospitals, but, of course, I had to stay in the hospital three days with that operation by Dr. King.

And, oh, some social things happened. The Rainbow Girls had what they called a "Meet a Secret Pal" night, and I was chosen as a "secret pal" of Nancy Edmundson, who lived at Arrowhead Drive in Carson City, was fourteen years old. And she had a station in the Bow; the color was green. Her father's a colonel in the Air Force, and he's stationed in an office job in Carson City. Well, that was an enjoyable evening for a change.

On Monday, March thirteenth, I had a date with Dr. King at three o'clock. He had me all fixed up with that arm, of course, and I had to keep it in the sling; and he thought it was about time to remove this sling if I would be very careful. So the sling was removed, and I was told not to lift anything at all of any weight for a least three weeks. And I was to return April third at three P.M. for another appointment.

The next thing which I've noted was that Ruth went up to the Carson-Tahoe hospital for her operation on the twentyfirst of March to remove the cataract on the left eye. Dr. Spector was the surgeon, and his assistant was Dr. [Ralph] Stephens. Just made a note that the price at that time was only six hundred and forty dollars for the operation and only a hundred and twenty-eight for the anesthetist or assistant. Mrs. Little had another one four years later, and the prices went up considerably.

Ruth's operation was at twelve o'clock on Tuesday, March twenty first. She was on the table about an hour. After recovering, she was very thirsty and drank quite a lot of water. The anesthetizing pills apparently had made her

thirsty, but she became very ill, stomachwise, and she took no food all day and had a rough night. However, the next day she was much better, and the following day.

Well, it's a great time to have company, but company came on March the twenty-fourth. Martha Landenberger, a friend of ours who had worked for Ruth, and two of her daughters called from Sacramento and said she and Marlene and Myrna would be in Carson at twelve-thirty Saturday on one of those bus tours, and would leave at twelve-thirty Sunday and would stay at the Frontier Motel. And she wanted to see us both. Well, I said, "Come ahead—Ruth is in the hospital, but you can see her."

Martha and the girls arrived at the Silver Spur, and I met them at about one-thirty on the twenty-fifth (Saturday) and took them to see Ruth. And then we took a tour of Carson City, which was a different town than they had known back in the 1940s. And the following day I took them to the museum, and we toured that.

Martha became acquainted with us in a rather interesting manner. She was the mother of six girls and two boys, and her husband had left her after they got into Carson City, and no one knows where he went. And she had very little money and needed some money and something to do. So we had her help at our house and moved her family in our basement. (This house we were living in at the time had a big basement.) And she had five of the girls with her and her two little boys; and the other girl was at work in Sacramento. She stayed there two or three months, worked for us and for other people, and was very little bother, and she had those children so that they *really* behaved; and we thought a lot of the family. She finally got a place to rent and a better job, and the two oldest girls had part-time jobs; and she lived in Carson City for about

two years, then moved to Sacramento. It was a very fine family. We attended a wedding of one of the girls.

Martha didn't have much education—about the equivalent of eighth grade. But after she went back to Sacramento, she went to night school and got her high school diploma, and her kids and the sons-in-law had a big party with a big banner up: "Martha made it!" [Laughs] We didn't get invited to that, but I think that was a fine thing for her to do. She was of German descent, and I believe she was raised in North Dakota.

Ruth was released from the hospital on Monday, March twenty-seventh. The youngsters weren't up here—our girls were not up here while she was in the hospital, but the oldest daughter, Moss Helen, and her husband came up a week or so after she was home.

I had a date on April third with Dr. King for a further examination of the arm, and he thought it was all right. And on the tenth, Ruth had a date with Dr. Spector for an eye examination. Of course, she was to get contact lenses, but those cannot be put in the eye or used until quite a little time after the operation.

I woke up several nights with a bothersome ear; the skin of the ear was hurting, and there was a sort of infection in there. It was the left ear. So I thought I better see Dr. King. Went up on Friday, May twelfth, and he cut little pieces of the sore out and sent it over to Reno to see if it was cancerous, and he expected a reply by Tuesday, May sixteenth. And it was a skin cancer, and Friday, May the nineteenth, he removed it with a local anesthetic in his office (so I didn't have to go to a hospital), sent some of the cartilage that was not removed back for another biopsy, and everything was okay; every bit of the cancer had been removed. So that was over. And

I had it bandaged, of course, so I had to go back May twenty-second to have bandages replaced, and that kept up for several days. I think the bandages [were] all over by the twenty-sixth; in fact, I have a note saying he took the stitches out on the twenty-sixth, and that was the time he told me the second biopsy showed everything clear, and there would be no more reason to return for examination on that particular operation.

I got some bad news on the first of June. These hospital bills, although were partly paid for by insurance and Medicare, hospital and doctor bills were terrific, and I couldn't get all my income tax paid at one time (what hadn't been taken out of my salary), and I was told I owed still about twelve hundred dollars with a forty-dollar penalty and about eight dollars interest.

On June the eleventh my garden got hit by a frost. (Got a note saying, "Damages were noticed on the tender plants, such as beans, potatoes, tomatoes, corn, nasturtiums, marigolds, and squash.") I was able to get part of my garden in. The rest of my summertime was spent—or that is, up until August—principally with the Reno Municipal Band, and we played, I believe, for Decoration Day and for the Rodeo parade in Reno on the twenty-fourth of June. And, of course, we played the regular concerts every week, and Fourth of July we played for the Republicans, and again in the evening for the fireworks. And the ladies of the Shrine—I believe they call themselves the Tombola or some such name—had us play for them at the Washoe General Hospital on July eighth, which was a Saturday. And we went to Greenville on Saturday, the fifteenth, and played in the parade and concert. Those trips were always enjoyable with the Reno Municipal Band.

About the next note, which I do not have—I thought I did but do not—had to do

with Ruth getting her contact lens. At least she had it, and in addition to contact lens, she was given a pair of glasses to wear, but the contact lens gave her trouble getting it out of her eye at night. The reason she had the trouble, the other eye was gradually losing sight because it was developing a cataract.

CARSON AIRPORT

In the meantime, I had arranged to be the inspector on the construction job at the Carson airport. That was supposed to start on the first of August, but it didn't start until the eighth. Of course, during the time that I was inspecting, I had some private work to do on the weekend, which had to do with doing assessment work on the mining claim—I'll explain that briefly first.

That was done on Saturday, the nineteenth, and I had Bill Wiley from Sparks do the work with the backhoe. But there was some trouble. I found that somebody—some kind of vandals—had torn down our monument and had taken out the location notice. A new survey had been made, I think by a gentleman who's trying to start a subdivision out there, and his corner was on beyond our survey, and I don't know whether he was the person who did the damage or not. At any rate, I contacted Dick Allen in Reno, whose mother, of course, was an owner—part owner—of the claim. Dick saw a lawyer and said as long as we had the thing recorded and assessment work done every year, they couldn't do a thing to us. But Allen also made up a map, showing the location, and that is on file.

During July, I had been in contact with the Carson City officials, regarding inspection of the extension on the Carson City Airport and enlargement of the parking apron. This was to start about August first. Actually, however,

the start was not made until Tuesday, August eighth.

Paul Loomis was the city engineer after September 1972, but all the general supervision was left to Dale Ryan, the assistant city engineer. My reviews were with Ryan, and my daily reports were submitted to Ryan. I had direct charge of inspection of materials and the contractor's procedures. A city employee, Boyd Mitchell, was to handle the inspection work, but he was busy on other construction jobs in this rapidly growing and changing area. Boyd did visit the job a few times but it was more of a courtesy call than checks of my inspection.

This project was let to bid during the summer of 1972. Sierra Paving was the low bidder and was awarded contract. I do not have the exact figures, but it was approximately a hundred and seven thousand, and allowable completion time was 240 days, which, to my way of thinking, was way too much. The job consisted of lengthening the easterly end of the airport about six hundred feet, and enlarging the parking apron up at the terminal. There were a total of twenty-one items in the contract.

Two subcontractors were hired by Sierra Paving to do the special work items which Sierra was not fully equipped to do. Ken Hellwinkel was hired to do the grading and haul the fill material from the hill on the north side of the airport and borrow from a borrow pit. Hellwinkel's headquarters were in Douglas County. Harker and Harker of Reno was the firm hired to do all the electrical work, which included the light on the hillsides, installing of the VASI system, changing cable location near the airport office when the apron was enlarged. I may as well explain right now the meaning of the word VASI. Those four letters combine to form one word, and they stand for "Visual Approach Slope Indicator." In other

words, as the airplane starts to land, he's lined up and given his slope by this VASI system.

All the base and paving and a portion of the concrete work on minor structures, plus seal and screenings, are items handled by prime contractor, Sierra Paving. I'll explain first the work done by Hellwinkel, who was the first on the job on August 8, 1972. Hellwinkel was a small operator, working with two to four men besides himself, and he had several pieces of equipment. He didn't need too much, but what he needed, he did have.

My daily diary for Wednesday, August ninth, shows personnel as follows: the superintendent, which, of course, was Hellwinkel himself; one equipment operator; and his boy, who was doing some of the work; and an additional equipment operator; and one truck driver; and one grade setter. (I will give this now, and I will not repeat it for each day.) The equipment moved to the job site by Hellwinkel, but not necessarily all of it was used at first. The equipment consisted of a grader (Cat No. 12), one 'dozer (Cat No. 8) with a fourteeninch blade, and one twenty-five hundred-gallon water truck, two Wabco scrapers, and one vibratory roller. (The last two items were on standby the first day or two.) All the equipment items thus listed except the two scrapers were equipped with very good safety flags from the standpoint of visibility and quality. Those safety flags must be on the equipment, as they're working around an airport.

I'll describe the second day's activities to illustrate the kind of work done at the start of the job. First, the hillside to the north was to be used as a source of unclassified material for the fill. It was a rough, rocky, brush-covered hill; thus the very first operation was to clean the area to be worked. About three hundred cubic yards of rocks, boulders, and brush were pushed into windrows at the base of the

hill. Then the 'dozer worked the material into a big pile at the westerly edge of the borrow pit (the borrow pit was an area in the flat, a little to the east), and the blade cleared a portion of the north runway and windrowed the cleared debris on the southerly side of the south runway. Clearing had to be done before anything else. This runway extension of about six hundred feet was in all fill sections. There was quite a hole there, which had to be filled up to bring up to grade in order to lengthen the runway and the rest of the airport.

Bob Rogers, the grade setter, arrived around eight o'clock, and I tried to help him find elevation markers, but we found none in the immediate area. I helped him with the stakeout of the north boundary of the north runway. The water truck was busy wetting down loosened soil on the south runway. An additional water truck would be put on the job Thursday or Friday. Material used for fill at this time of year is extremely dry, and it must be wetted sufficiently to reach the specified percentage of compaction when placed in the fill. For this kind of material, the borrow pit usually took about eight or nine percent and probably about as much for the rocky material up on the hill.

Contractor, Mr. Hellwinkel, asked about the present cable on the hillside, which carried electricity to the light placed there. The cable will have to be carefully avoided by the excavating equipment. City employees arrived and dug up a portion of the cable and flagged it for visibility, so the equipment operators wouldn't run into it.

The following day, August tenth, a two-man survey team, consisting of Jim Rankin (former Ormsby County engineer) and Les Filippini, began staking out the borrow pit and put in placement of elevation markers on the proposed construction. Hellwinkel began placing and compacting fill material

for subgrade. Jim Singer (tester from Sharp and Krater engineers, Reno) arrived and took samples of proposed fill materials. These samples will be run at the Sharp and Krater lab to determine the moisture density relationships to use as standards in determining future compaction values. Compaction values are ninety-five percent minimum.

The following day, Singer took several samples on both sides of the centerline on north runway, and all passed with values of 98.1 up to 101.4 percent. Going over a hundred percent seems strange, but when the tests are made, a certain value's determined in the laboratory, and it's possible even to compact it more densely than the laboratory compaction; so that is why sometimes the compaction results exceed one hundred percent.

I was furnished a key to the south gate at the east end of the present runway and had to be on the job early to open up for the contractor. All the south side of the airport was fenced, as residential trailers were located immediately south. Allowing residences so close to an airport seemed to me a very poor policy from standpoint of safety.

The weather was quite warm this August eighth, ninth, and tenth, and eleventh. Temperatures reached to between ninetyseven and a hundred. It cooled considerably during the next week and was quite windy.

Hellwinkel was consistently on time and was very cooperative. He lost one complete day, however, later on, due to an auto accident in his family.

The principal work on this part of the contract was securing and placing fill and keeping the water on the freshly laid fill lifts to secure desired compaction. The compactors, both the vibratory and the Hyster rollers, were kept busy, and the contractor was especially

cooperative in producing compaction meeting specifications. For airport construction, more compaction effort is needed than for an ordinary highway, especially on the runways. Testing for compaction is almost a must, every day.

Garrett Gobeli was a Sharp and Krater tester beginning August sixteenth, and he continued until the grade and base course was finished, except for a short time when Ed Brown substituted for him. The percentage of repeated compacted effort was kept to a minimum; there were not more than ten or fifteen percent of the initial tests, which gave results below the required figure. When such tests were found, immediate attention was given to more compactive effort, at the same time securing more wetting when necessary. Hellwinkel saw to this. The rocky, unclassified material from the hillside was covered by sandy material from the borrow pit, thus leaving very few voids in the compacted material.

There were, of course, the usual amounts of breakdowns of machinery, but repairs were speedily made. Water trucks would get stuck on the steeper parts of the rocky hillside, which caused some delay; they were usually moved out by aid of a 'dozer.

One of the equipment operators was Ken Hellwinkel's son, as I have mentioned before. Since he was still in high school and had to leave the job when school started, why, he wasn't there after September—beginning or early in September.

Hank Bennett, supervisor of Harker and Harker (the electrical contractor), spent some time with me August fifteenth going over specifications for electrical work, which would not begin until the grading was about finished.

On the sixteenth, Boyd Mitchell was on the job at eight A.M. to deliver slope information

to the grade setter on the last two hundred feet east. We needed this information.

On the seventeenth, the Carson Fire Department objected to the contractor's securing water from the nearby hydrant—that is, at the east end. He said it reduced considerably the pressure locally. The hydrants near the terminal were to be used, instead of the hydrants down on the easterly end. This would increase the length of haul and would tend to slow down the job, and would probably force the subcontractor to put on an extra water truck, or maybe two. I called on Les Groth, the fire chief, who claimed that he could show no favoritism to contractors. After one-half hour of arguing, he conceded and allowed use of the nearby hydrants. Hellwinkel was again in business.

Fifteen compaction samples August seventeenth and eighteenth showed eleven passing the ninety-five percent requirement and four too low. Watering and rolling brought the nonpassing areas within specifications. Large boulders encountered on the hillside were drifted by a 'dozer to a hole excavated between the runway and cleared area on the westerly side and were buried by covering with soil. This meant unpaid-for work by the contractor, but he kept the government ecologists out of his hair by doing it.

Where the rocky, unclassified material from the hillside (even after mixing with the sandy borrow) showed poor compaction, the contractor thought of a scheme to get correct compaction on the first test: after one initial rolling with the Hyster roller, it was rescarified with the ripper, more water added, then wheel-rolled with a heavily loaded scraper, after which it was gone over with the vibratory roller before testing. This worked out very well.

Some damage was done to electric concrete pipe by a blade attempting to remove

large stones from the top foot of the conduit trench. This happened Friday, September first. The unclassified material source, that is, the rocky hillside to the north, ran out of usable material about that time, therefore, some of the rocky part of the borrow pit, which we had purposely bypassed, was used in the lower layers of fill and covered by more of the sandy borrow.

I took the grade setter into the office to discuss with Assistant County Engineer Dale Ryan the extra fifty feet of three percent slope north and south between Stations 60 and 62. Ryan said to restake the area, but there would be no pay item for the extra yardage. (Hellwinkel was told of this, but seemed to offer no objection.)

On September fifth, Harker and Harker had Bud Rae and a laborer on the job. The laborer was a character of sorts; his nickname was "The General." They staked the proposed new electric conduit line from Station 54 to VASI. They also staked a line for cable trench from the job centerline at Station 54 across the crossover pavement to a point three hundred feet westerly. "The General" then climbed the backhoe they had brought from Reno and began excavating the trench on crossover which they had just staked. He started at twelvethirty and finished at one-twenty P.M.—a fine-appearing trench. He also dug two other trenches for electric cable and finished all the digging by four P.M.

In the meantime, Hank Ebers (foreman for the prime contractor, Sierra Paving) and a helper arrived on the job at two-fifteen P.M. The grade setter and I helped them with the stakeout for a hundred and fifty feet of pipeline for drainage. This pipeline would go under the east crossover, but was placed on an angle to the south to obtain better drainage. This date, September fifth, all three of the contractors' crews were at work but managed to keep out of each other's way.

The following day, Hellwinkel's crew arrived at seven o'clock, and I was there and had the gate unlocked. Marker's crew arrived at eight-thirty, except Bud Rae, who came in at nine-fifteen with a load of conduit pipe for electric lines. Ryan and Mitchell came in at the same time, and Ryan explained some of the plans for electrical work. They told me that an accident of some kind had caused the electric cable at the plug-in to be pulled loose last night, and they had to come out and reset it to get light to the airport headquarters. I had been unaware of the pullout. Dale asked me to stop at the airport every evening after this, when work was over, and try out the lights.

In my numerous notes I have listed all the brands and sizes of electric cable and the pipe conduits to be used in the job. There are too many such details to explain here. All of the wiring, of course, has to be underground on an airport; and some of it is direct-burial cable with thick insulation, but much of it is put in plastic conduits, especially where there are many wires through.

Hank Ebers also arrived on the job at ten-fifty and stated he would start hauling and placing base course as soon as subgrade is all finished and will meet compaction requirements.

It was on this date, I believe, when I was visited by Jim Rankin, who was county engineer of Douglas County; he had been Ormsby County engineer. Jim wanted to know when I would be available to do some inspecting on Douglas County's road and subdivisions. I could not give Jim a definite date, but informed him I probably would be sewed up 'til cold weather on this airport job.

Savage Construction Company was on the job, and they poured concrete in a trench for electric cable crossings on a taxiway and a crossover on the new work. I was equipped with slump cone and concrete cylinder molds.

I found the mix to have a three-inch slump, and I prepared two twelve-inch-by-six-inch cylinders for strength tests. Cylinders were buried for the initial cure four days before shipping to the tester.

Hank Ebers, the next day, gave information concerning gradation of the proposed base aggregate. I checked and found it met Nevada state Highway specifications.

Three bottom-dump trucks and a fourth end-dump truck with "pup" were available to start the base gravel hauling. (I must explain that word "pup." It might not mean anything to a lot of people, but some big trucks are equipped with a trailer-type truck which is not full size, and they call it a "pup.") On this same day, C. G. Hand (testing engineer) and Russ Hathaway (chief planning engineer with the FAA), San Francisco and Los Angeles, respectively, visited the job along with Dale Ryan. Mr. Hand made only one requirement, which was that separate conduits must be used for the high and low-voltage cables. In other words, you could not put two different voltages in the same cable. We assured them this would be done.

Fuller Engineers sent a two-man survey crew out on September seventh, and they worked four and a half hours setting out stakes on the borrow pit for cross-sectioning. This is done to determine the quantity removed when royalties to owners are involved. They will finish it in about two hours tomorrow.

Areas which were completed as far as subgrade was concerned were checked for elevation and slope and receiving base gravel.

On September eighth, a fifth truck was added to the hauling vehicles. Hellwinkel's crew were finished with everything on the east end except the cleanup. He spent about two and a half days from September eighth to eleventh on the cleanup and trimming slopes with a blade. Some of the cleanup included

smoothing as much as possible the rough places on the hillside.

He moved his crew to the apron area on the thirteenth. He had two Wapco scrapers, one 'dozer, and as I remember, borrowed a backhoe to dig an experimental trench—a long one. This was done to check shrinkage of subgrade to help in determining proper thickness of base course to be placed. This was important because the finished paving had to be at a specified elevation, which would be approximately the same on the parking area as on the adjacent runway. All three of the contractors' crews were operating at the same time for several days, and I was kept busy as a cranberry merchant.

There had been some delay at the apron site. Ryan requested the delay in taking up the old cables because of a pending air show, or meeting, which would require all the parking space. However, the affair was finished by the time Hellwinkel was ready to move.

Base course on the new runway and taxiway at the east end was well watered and rolled. Garrett Gobeli took several job compaction tests, but before results could be computed, tests had to be made in the laboratory on the gradation in determination of significant factors of the compaction curve. Later the results of nuclear tests of compaction gave results of 99.4 and 101.3 and 101.6 for the gravel base, which had a water content of about five, six percent. These were excellent compaction figures. The base depth measurements, however, gave a different story.

On September fifteenth, I started at seven-thirty A.M. with a grubbing hoe and dug thirty test holes. Only six of the depths were okay. Most of the thickness checks were low (two to five inches), and a few were high (six to nine inches). Blame for such variable results can be placed on poorly set "red heads" (that's

a term applied to grade stakes), especially in the middle area of the runway. The contractor asked for a rerun by the survey crew.

The eighteen-inch reinforced concrete pipe was being laid this date by the prime contractor. I was unable to check elevations on every piece of pipe due to press of other work, but I did enough checking to fairly well judge that it was okay. Harker's electric crew was busy placing the four-way, three-inch conduit in a freshly dug trench under the parking pad. This was all on the easterly end. Hank Ebers with Will McCulley, started the check on the runway "red heads" soon after I gave them results of my thirty test holes on the base.

On September fourteenth, I arrived at the gate on the east end and unlocked it at seven-fifteen. The Fuller engineering party of five arrived shortly and started resetting the "red heads" for the base course. I might remark here that that could have been done correctly in the first place, and I don't know what Ryan's thoughts were on it, but he probably said something to these people for not doing a good job in the beginning. I stayed with them until eight-fifty. About eight o'clock Dale Ryan came in, and we all checked depths of base. We found wide variations. There were quite a number of low places at quarter points between the runway centerline on the northerly edge. There were a number of variations also here and there.

Dale stayed with the survey crew for two hours. Hellwinkel had worked over the subgrade on the parking area, and the test had shown good compaction. The southeast corner showed 101.3 percent. Subgrade over the four-way conduit trench showed 9.7 percent, and 104 percent was obtained at a point sixty-five feet west of the north-south taxiway and twenty-five feet south of the north edge of the new parking area. This

sounds like a bunch of Greek, but on the map, that is what you would have to do—know all those terms—in order to find a place where the test was given.

I had to spend some time with the electricians checking wire sizes and types, and secured from them a price differential which saved some money. This referred to a substitution of a concrete box taken out of the parking area for a five hundred-dollar designated box on the south end. Before the day was over, we received two more visitors representing the FAA—H. Gunnar Tennesen from San Francisco and A. T. Carman, electrical engineer from Los Angeles office. They realized that the job was not at a point where their inspection could be made. The call thus was more of a social one than technical.

Returning to the “red head” problem on the base course on the east end, a blade was put on and was given assistance by a guinea runner—that’s a boy who runs along and pulls stakes where necessary. He attempted to pull down the high spots and fill in the low ones in accordance with the newly placed “red heads.” Depths probably would have to be checked again as soon as I could find the time, but it would have to be before paving could begin.

Friday, September fifteenth, I arrived at airport at seven o’clock to see if the surveyors had arrived. There were no gates to unlock for access to the parking apron; they could come right in at the airport. Surveyors were not there. I drove to the new work on the east end and unlocked the gate for the Sierra Paving. The Fuller survey party of three arrived at the apron at seven-thirty. I was on the other end of the job when they left, but I doubt if they were on the job more than a couple of hours. Sierra Paving finished backfilling over the reinforced concrete pipe drain and compacted it with a whacker.

Waste dust from the trench was stacked along the north side of the fence, then knocked down by the blade so that it wouldn’t be so unsightly for temporary looks. The trench dug at the end of the present pavement was presumed to locate an old, buried conduit, but none could be found. The trench was backfilled and wet.

Harker and Harker’s crew placed fifty-six feet of four-way, three-inch conduit in a trench on the apron from where they left off earlier in the week to a point which is the approximate location of a proposed manhole south of the taxiway. Three and a half cubic yards of concrete were poured on that portion of pipe which had cable through it.

One of the Harkers appeared at the airport at ten-fortyfive in the morning. The crew hauled the concrete box which was removed from its location in the apron to the hillside site for use as a pull-box. This was done as agreed previously, and the cost for its installation would be two hundred dollars instead of five hundred for the designated box.

On Monday, September eighteenth, Hellwinkel’s crew was not present. The family had an auto wreck, and most of them, including Mr. Hellwinkel, were at the Carson-Tahoe hospital. I planned to call on them this evening. This was an unusually warm morning, but became windy, cool, and cloudy in afternoon.

Sierra Paving crew was in by seven-forty-five with men and equipment as follows: Foreman Will McCulley, one laborer, one apprentice, one operator, one blade man, five truck drivers; equipment consisting of a three-wheel roller, a water truck, three bottom-dump trucks, two ten-wheelers with “pups.”

There was a question by McCulley about the grade on the parkway, west to east, being only two percent. I called at the office, and Dale Ryan said, “Put the grade in exactly as

shown on plans; don't change 'em." This was done.

Garrett Gobeli arrived at nine-thirty A.M. and took one sample at the crossover base course. Sierra Paving operations were confined to hauling, spreading, watering, and compacting base course gravel.

Harker and Harker's crew arrived at nine o'clock and consisted of Bud Rae, foreman; one laborer; two ground men; and one carpenter. Equipment included one Michigan loader and one trencher. This crew set the concrete pull-box on the hill, but first partly filled the trench with bedding sand and placed sand over the cable. A trencher was at work on the east side aligning trench, but encountered trouble with boulders. Doublederricked burial cable was used for the manhole box—that is, the box at the north edge of the pavement—uphill to nearby installed pull-box.

Larry Trigerro, the carpenter, aided by one ground man, were busy framing for a pull-box on the parking apron, but Larry took sick and left before noon.

Harker crew borrowed Sierra Paving water truck and wet down excavated soil backfill around the two pull-boxes poured last week. A whacker was used to do the compaction around the boxes, but it ran out of gas before finishing. I went with Bud Rae to check the operation of newly placed cable for the red light on the hill. Light would not turn on. We found that Larry Trigerro had temporarily disconnected the cable in the pull-box that he was working on. After connecting the cable, the light came on.

Sierra Paving had a problem with the high wind blowing over their turning flag stands—that is, on the airport work, you have to put flag stands where heavy equipment makes the turnarounds, so they will not damage already built structures. The problem was solved by weighting the flags down, so they could not be

blown over. Weighting material consisted of old concrete blocks picked up here and there.

On Tuesday, I unlocked the gate on the east side and drove to the apron. Part of Sierra's crew arrived at eight o'clock, others at eight-fifteen. A first load of base gravel came in at eight-twenty-five—we had only three trucks. At ten-thirty, most of the parking quadrangle was presumed to contain sufficient base, and the trucks were taken off. Watering, blading, and compacting continued until the whole area appeared to be right up to the "red heads."

I dug nine test holes and measured the base thickness. The nine measurements varied from five and a quarter to seven inches (averaging six inches), which is one-half inch greater than the five and a half inches called for. It is almost impossible to get an exact amount of gravel over a compacted subgrade which is fairly level to start with, because some places which are slightly softer than other places will give under the load of gravel on top when it's compacted hard, so that you will find different depths. Although the surface is quite level and to grade, the bottom of the base course surface is irregular; that's where you get the great variations in the base.

The following day, I took five more depth measurements at edges, and the midpoints of two of the strips—these were way over the five and a half-inch depth specified, varying from six and three-quarters to eight-inch, the average [laughing] being seven and a quarter inches. It appeared necessary to leave the base as thick as it is on the southerly portion of the quadrangle.

High spots out a few feet to as far as thirty feet on the west of the quadrangle should be lowered. I needed some confirmation of my thinking on this. I would also like to see two inches to two and a half inches of paving on this area to correspond with the blacktop

already in place; otherwise, an adjustment at the edges of the pavement already in place would have to be done with base. (It could be done with blacktop.)

The Harker crew arrived at nine o'clock and hooked up to the trencher, and Rae started digging the trench at the south side of the runway at the east end. At this point, the laying of the cable for the lights was to begin.

At twelve-thirty P.M., we relocated the radius point for the turnaround and staked out the trench for the east end of the runway. Two of the Harker ground men began forming (doing the carpenter work to pour concrete later) the pullbox on the apron where Trigero left off yesterday. The east end trench was all dug by two P.M. We started out to do a trench for lights at east end; the trencher started at threeforty and finished by quitting time.

September twentieth was clear and warm in the morning. I arrived at the airport at seven-thirty and found no workmen. I went to the lower end and spent a half hour writing reports. I went back to the apron at eight o'clock. The two Fuller surveyors, Phillips and assistant, arrived shortly after eight. Will McCulley arrived later and took a blade out. McCulley was unhappy to see the Fuller engineers. He figured that would mean more blade work, and he had to use it elsewhere.

Hellwinkel's men arrived at nine-ten, and they partly leveled the mound and hole earlier dug in order to load the 'dozer on the truck. Then they took away two of the scrapers. This ended Hellwinkel's part of the contract, which embraced approximately one-third of the cost of the job.

Since there were no contractors' people left at the airport, I reported at the office, and took the car to the garage for some needed repair work. This consumed two hours, which, of course, I could not count as job time. I returned to airport in early afternoon and

found the Fuller engineers still setting more "red heads." Mitchell came out to see about lights under the north eaves of the airport building. There was a telephone complaint by the bartender inside that the lights were off entirely. This was Mitchell's affair, and I had no part of it, so he apparently settled it.

I awaited arrival of Garrett Gobeli to get three or four tests on the base. He did not show up. The surveyors had finished around two-thirty P.M.

The following day, I waited from seven-thirty A.M. 'til ten o'clock before anyone showed on the job. At that time, Larry Trigero and helper from Harker and Harker arrived and continued forming for concrete pour on the pull-box. I went to the office about ten and came back with Dale Ryan. We looked over the apron for a need to blade off the high spots on the base, also looked over the concrete floor being poured for the new hangar.

In early afternoon upon my return from town, I found Garrett Gobeli on the job taking the samples of the base. Concrete for the pull-box, which was now all formed, came at about two o'clock.

I spent two hours September twenty-second at the airport waiting for the electricians. I rearranged the flagging around the fresh concrete floor for the hangar, then called the Harker and Harker office. They reported that there could be no work 'til the special machine used for boring under the pavement could be brought down from Battle Mountain. This machine was needed to force a steel conduit under the pavement pad, thus avoiding shutting down the airport runway by use of a trench. According to the Harkers, all other operations would be discontinued 'til this machine could be moved in, which they estimated would be October first. This notification should have been made by the prime contractor to the Carson office

yesterday, thus avoiding necessity of me reporting at the airport, needlessly.

There was an astounding lack of professionalism, not only in communications but in many other respects in the Sierra Paving and Harker outfits. [Laughs] The best professional operator on the job was Subcontractor Hellwinkel.

The next five days there was no work on the contract; however, I was not sure that someone might do a minor job with a possibility of interrupting electric service. I therefore drove to the airport about five-thirty every evening and checked lighting. (If I hadn't come out and then if something went wrong with the lighting, I would be blamed because I hadn't been there.) Now, I didn't charge the city for that, but I figured it was my job to do anyway.

John DeNevi (a working foreman for the Harkers) and a laborer started operating a backhoe on September twenty-ninth. This was done on either side of the operating runway. They were trenching to get ready to force the steel pipe under the runway and also trenching on beyond there. They were on the job for less than a full shift, and I stayed with them but a short time.

On Monday, October second, I arrived at the east end a little before eight o'clock and unlocked the gate. I noticed the field lights were still on. I drove to the airport and reset the flagging, which had been disturbed by the wind. The sky was a hundred percent overcast, and apparently was the cause for the lights being on at the time.

John DeNevi and Joffre Trescartes arrived just before nine o'clock, and continued trenching with backhoe. They placed the machine (for forcing the pipe in the trench) adjacent to the runway and by ten-thirty were ready to proceed. They had fifty-five feet of steel pipe pushed through by noon,

but rocks had diverted the direction of the pipe too far southerly and at least two feet too deep; therefore, the pipe was pulled back, and they moved two feet north and repeated the process, this time getting the pipe in line with the trench, but it was still deeper than intended on the north side of the runway. They apparently encountered hardpan, which forced the pipe downward; nevertheless, they deepened the trench on the north side and left the steel pipe in place. Electric cable was threaded through the pipe at a later date.

On Tuesday, October third, no one showed at the job site until about nine o'clock. Then only Trigerro and Dave Lane, Sierra Paving men, arrived, and removed forms from the reinforced concrete box on the parking strip. These two men were the only ones that stayed on the job 'til quitting time. After finishing at the parking apron, they moved to the eastern end and removed forms front a poured puncheon box and also put in the forms for the other boxes in that area.

At ten-thirty in the morning, two Harker men arrived, but their only purpose was to secure the backhoe; and they took it to Carson City to do a one-day job.

On Wednesday, October fourth, Hellwinkel came into the area to confer with the Harker crew about a runway light which was accidentally broken by one of his crewmen. The light in question was the third one from the east end of the present runway pavement on the north side. Hellwinkel told Harker to replace it, and he would pay for it. Upon examining again the present runway lights at the east end, I discovered the first and the second lights were also broken but by parties undetermined. This was to be investigated further.

This part-time and occasional work by small crews was disturbing to me; I did not feel like charging a full eight hours for my

time on this piecemeal work. Actually, Sierra Paving and the Harkers could have finished this job in about ten days after Hellwinkel was through, if they really worked at it. However, there was no way they could be forced to do so because according to the contract time, they still had a hundred and sixty days or more to finish. Apparently both contractors had several jobs going, and were trying to do those first which had shorter time limitations.

On October fifth, Bud Rae and helper arrived at eighty-five in a pickup and a flatrack and unloaded boxed fixtures for the VASI. Larry Trigerro and Dave (his helper) arrived at nine-fifteen with supplies for their work on structures. They placed steel covers on two finished pullboxes adjacent to taxiway, also the one on the hillside. They also affixed risers on the manhole at the end of the steel pipe punched through yesterday, then covered with moist soil, and compacted with a whacker. They did a good job.

I will not explain in detail all of the pay items, but each day a structure was completed, and I accepted it. And when the conduit or cable was laid, I took all measurements. I turned in my measurements, usually, weekly.

Three pull-boxes remained to be constructed, and the Sierra Paving crew had them all formed by two-fifteen P.M. I had state highway test figures on the Number 4 reinforcing bars and the concrete aggregates used in the mix. Bjarne Peterson delivered the mix.

I prepared two concrete test cylinders after first making the slump test. Type Two cement was used with three-quarter maximum-size aggregate. The cement, sand, gravel quantities in pounds were respectively 564; 1,372; 1,677; and with thirtysix gallons of water in the mix. (This will give future historians some idea of the type of concrete we poured these days.) Although the pull-boxes were for electric

cable, the concrete items were taken care of by the prime contractor, Sierra Paving.

The Harker crew this date staked out a line for running the lighting cable. The backhoe to dig the trench was not on the job, but Bud Rae finally found it in Carson City, digging for underground cable for the power company installation in a new subdivision. It could not be obtained to dig the airport trenching 'til tomorrow.

Friday, October sixth, both Sierra Paving and Harker arrived with relatively full crews and adequate equipment, and actually spent nearly eight hours on the job! Sierra Paving placed the two ends on the eighteen-inch, reinforced concrete pipe and mortared and backfilled them. The Harker crew had the backhoe working on the trench across the taxiway north of the new parking apron, then assembled and laid a fourway, three-inch conduit with cable inside. Fifty-six feet of conduit and four-way cable was required. This crew also stripped forms and filled around the pull-box poured about ten days ago.

In the afternoon concrete was delivered by Bjarne Peterson again; it was a stiff mix with two-inch slump. A pull-box was poured, and the fifty-six feet of conduit laid in the morning was also concreted because it was under a taxiway. I better explain there—it was under a taxiway to be built on the new paving. There was no aircraft traffic on it, so the trench was trenched right across the taxiway, which would be filled in and compacted and base put over and paving before it was completed.

Light standard holes had been dug by a soil auger on a portion of the new east end extension. Standards were set and concreted in. More trenching and cable was still to be done before remaining standards could be set. The trench was dug, however, by a backhoe, near the end of the eight-hour shift.

The Sierra Paving blade had been attempting to cut high spots and drift the residue into low spots on the parking apron base, which had been “red headed.” Only a fair job was done on the north side of the drain and a poor job on the south side. Three compaction tests on the apron base, two in the manhole area, and one across the taxiway gave passable results with eight and nine percent water.

On Monday, October ninth, the Harker electrical crew had more men and equipment on the job than did Sierra Paving. The Harker backhoe did more trenching on the south side of the new runway on the east end to find an end of a three-inch conduit on the old line.

The first work on the VASI Number Two was started today. A carpenter and helper built rectangular form for the VASI installation, and trenching was far enough along, so the total of 1,399 feet of single cable and 385 feet of four-cable lines was strung out and placed in trenches—that is, one particular trench had four cables in it. Some was direct burial, and some was placed in conduits; the latter were where plane traffic would cross the lines.

The Savage concrete truck came in at one-fifteen to fill four-cornered postholes for the VASI floor support. Concrete looked good, but I did not have time to make tests other than slump, which was okay. The truck also unloaded two and a half cubic yards of concrete into the VASI platform inside the old paving base. Two cable crossings and one signpost was poured also before the truck left the job. The concrete man did a good job finishing the concrete on the VASI floor. The north side [of the] backfilled trench was filled with soil only, watered, and wheel rolled to compact it. Six hundred and twenty-five feet of cable had to be rejected and hauled back to Reno on account of being too large in diameter. Visqueen was used to protect the

fresh concrete in the ten-by-ten VASI floor from moisture loss and possible light frost action at this time of year.

On Tuesday, October tenth, the only workmen to appear on the job were Bud Rae and Tom Duggan from Harker. Work included use of sand for the initial backfill to protect the cable and the trench on the south side of the runway. Trench excavation was then placed over the sand—of course, the trench excavation contained quite a few rocks—and the whole thing was then watered and wheel rolled.

The cables placed on the pullbacks on the north side of the old runway pavement were joined and taped and the box backfilled around the edges, but a blade would be needed to do a good finish job. We probably would get the blade to do that within the next few days.

October eleventh, twelfth, and thirteenth, there were no workmen whatever on the job. Monday, the sixteenth, was the same story. On Tuesday, October seventeenth, Bud Rae and helper arrived at eight-forty-five. The city backhoe was digging the trench from the regulator to pull-box, then to that point from the power source at the newly placed pole. This was, of course, to make the regular connection to the power line, and there was no power line quite near enough to do it without putting in one extra pole.

Rae and helper placed a meter load-center box of the underground type, variety—General Electric, model Number 2, TL-20214V (that is the designation). The control was all set and grounded by ten-thirty. They then moved a VASI platform to location inside the old pavement and began work setting it up. Eight hundred and thirty feet of four-way, single cable was fed from the VASI inside the old pavement and across the old turnaround and opposite the two boxes on the taxiway to

the regulator on the fence. The total line laid this date was 2,220 feet, plus sixty feet of large cable under the pavement.

On Wednesday, October eighteenth, this two-man crew set the VASI lamp-housing assembly at the east end and leveled a calibration bar. A walker bar was then set at a 2.5 degree angle on the east and 3.0 angle on the west. Both VASI's were grounded, and three of the four lengths of cable were laid on the east end. More cable was needed. There was no work by either of the crews on Thursday, the nineteenth.

Friday, October twentieth, Kurt Smith, the operating engineer for Sierra Paving, brought in a Ford four-yard truck and a three and a half-yard loader and began cleaning up the west end dirt piles and broken pavement fragments and broken concrete. This soil was hauled to the same dump area Hellwinkel had used, but the broken paving and concrete were hauled to the city dump.

A grader and a grade setter borrowed from Helms (contractor) started a fifty-by-a-hundred-foot area immediately west of the concrete electric center. There was supposed to be a paved pad there, but no one on the job knew why. I will check with Assistant County Engineer Ryan, as this was not shown on the plans.

Cleanup on the hillside was started at one-fifteen and continued until quitting time.

On Monday, the twenty-third, Kurt Smith (the operator) and the laborer, Cy Moore, cleaned up around the north trench. I found the south-side lights were out of line slightly and one sign was too far to the inside. I asked for correction.

We had a somewhat premature visit of the entire job by two federal officials from the FAA. On Tuesday, the twentyfourth, I received a phone call from the office a little before two P.M. that Bohn and Tenneson had

arrived. I picked them up and brought them to the job. These gentlemen were severely critical of almost everything they saw. I tried to explain to them that we were not to a point of finishing, and things were not yet corrected which we knew had to be corrected, that there were many places which we realized would have to be corrected before the job could be accepted, but we figured it was best to wait 'til construction was about complete and the cleanup made. I'm not going to mention all the detailed items they designated for correction, but I made out the list and turned it in to Ryan. They offered no complaints, however, regarding the VASI installation. (I couldn't help but compare these government men's detailed scrutiny of a partly finished job with my work as a federal inspector on the Tonopah airport in 1942 and '43; and, of course, that was a rush job—Tonopah airport—emergency job—and we couldn't go into too much detail. But, of course, maybe it isn't fair to compare the two jobs on that account. However, any inspection of the kind these two government [men] made should be put off until the contractor and the job inspector are ready for it.)

On Wednesday, October twenty-fifth, I arrived on the job shortly before eight o'clock, thinking the surveyors might be on the job. No one was present, so I went back to the county office expecting to find Hank Ebers and Jack Harker to discuss corrections to both paving and electric work, but they had not arrived. I went back to the east end of the airport and waited developments, if any. Fuller Engineers were supposed to have a survey crew on the job; they finally arrived at nine-fifty. Phillips, the head man, and two helpers were there. None of the Harker men showed up all day. Hank Ebers did show up at noon, and we discussed the FAA visit. Hank said he would do everything possible to get the job done

according to specifications, plus doing what he could to remedy some of the minor details complained about by the government men. Surveyors found variations in elevations were mostly less than one-tenth of a foot.

On October twenty-sixth, which was Thursday, Harker's crew was supposedly present but did not show up; neither did any other workmen of any kind. I spent three hours on the job waiting for them and used the time to write up reports and list the pay items. Again, no notification from the contractor.

Friday, October the twenty-seventh. This day started off with a cool wind with a clear morning but cloudy afternoon. Bud Rae and Cy Moore arrived about nine-thirty with 625 feet of wire. Four wires from the west VASI box were pulled through to the junction box after damaged conduit had been repaired. By two o'clock, all wires from both VASI's had been pulled from junction box through pull-boxes on either side of taxiway to control panel south of the fence. This is at the easterly end. All eight wires were placed, connected to the transformer, and then each wire was traced to VASI box, each with its proper connection with a Simpson meter. All of this work could have been done much sooner. Tomorrow would be October thirtieth and still no paving could be done 'til all electric work was finished.

I made a list of questions to ask Bud Rae concerning several technicalities relating to electrical work. I had them ready on the morning of the thirtieth; however, October thirtieth was another fruitless day. No electricians showed, and the Reno office did not know where they were.

October thirty-first was Admission Day. I donned the Shrine band uniform and joined in the parade with my French horn. In the afternoon I switched uniforms to the one for

the Reno Municipal Band which played the usual Admission Day concert in front of the old post office.

November first, Helms' crew—or part of them—arrived early, but instead of paving, they hauled the machinery away for some local, small job. The Helms crew, by the way, and their machinery were hired by Sierra Paving for parts of the job.

Bud Rae and helper did show up at eight-forty and spent all of the morning resetting the lights. I called the office to get Dale Ryan. He arrived at the same time as Hank Ebers, who was the Sierra Paving boss. The two men with him reset stakes for later "red heading."

At ten-twenty Mr. Tenneson of the FAA arrived, and three of us—Ryan, Ebers, and I—had a conference with Tenneson. Tenneson stated his requests and said he would leave acceptance up to our inspection. Then he left Carson City. According to page 192 of the FAA specs, the final pavement had to be checked for a one quarter-inch tolerance in the sixteen feet. Straightedging had to be done by the contractor after compaction.

Sierra Paving moved in a water truck, a rubber-tired roller with nine tires, and a blade. They managed to haul in three loads of base gravel, which was bladed and rolled and trimmed to conform to "red heads," and all looked very good. The end of the taxiway, however, was partly bladed and would have to be rebladed before paving. Ebers and crew pulled out at four-thirty P.M.

The electricians managed to visit the runway end and did some work on the lights and the sign standards. They finished some further wiring and placed manhole racks on two pull-boxes on the west end and left the job at three-fifteen.

On November second, both the Sierra Paving crew and the Fuller Engineers (the

surveyors), working together, managed to complete base to proper elevations on both the parkway and part of the runway on the west end. Both crews finished in two hours and left. I spent two more hours at the office preparing progress payments on base course. I also returned to the east end and put a padlock on the transformer box on the control panel.

On November third, I arrived at airport at seven-fifty, and Dale Ryan drove in a short time later. While waiting for the contractor to show up, we rode over the runway at a good rate to detect unevenness, if any. We had a smooth ride.

Dale drove to another job, and I continued to wait 'til ten-forty, then called the paving contractor, but no one had any information about the prime coat asphalt, nor when it would arrive. At eleven I saw Ryan at the office, and he said, "Try again after lunch." This I did, and was told the priming material and spraying equipment would arrive between two-thirty and three P.M.

I came back to the airport at two-ten and waited 'til three-thirty—no prime coat. [Laughs] I called Hank Ebers, and he guessed the truck had not gotten through. I wasted five hours this date, which also included three round trips to town. I questioned the probability of this contractor being able to finish his job before snow or extreme cold weather.

Word came to me Friday evening that the priming material will be on the job Saturday morning. I arrived at seven A.M. Hank Ebers was there before me. Each of us, individually, traveled over the areas to be primed and found no "bird baths," in spite of an earlier rain.

The Sheldon Company truck and trailer arrived with a cargo of MC-70 (that's the primer) at seven-forty-five. Now "MC" stands for "medium curing" asphalt, and "70" is its

viscosity, which is a lighter weight asphalt and, of course, is used in paving, itself. Temperature of the MC-70 was very good; it varied between 1500 and 1700 during the spreading. This being a light oil, of course it cannot be heated up to a very high temperature, or it might catch on fire.

The parking area—that is, the apron—was all primed by nine-thirty, and equipment was ready to move to the east end and put primer coat on the new runway and taxi areas. Ebers and I reset the side stakes on these areas and all others on the field.

I had personal business in Reno this date that could not be put off, since it was Saturday; and I had to leave the job at ten-thirty. At that time, only two more passes by the oil distributor would be needed to finish, but it was reasonable to assume that Hank Ebers would properly take [care] of it.

All the prime thus far placed looked very good. Hank said he would call Dale Ryan Monday as to his paving program. The apron took about a thousand gallons of primer, and the runway and taxiway about twenty-one hundred gallons.

Hank was not ready to pave Monday, nor on Tuesday or Wednesday, but did start on Thursday, November ninth [laughing]. Upon my arrival at the job site, Hank had the following equipment ready to operate (so he said): he had a Cedar Rapids paver; two rollers, each of twelve tons weight; and the Galion Roll-o-static steel breakdown roller; and the other was a nine-wheeler, rubber-tire roller. He had Will McCulley as foreman, four equipment operators, and one laborer. There were some delay in starting, but operations did start at nineforty. I had asked to have the asphalt mix on the high temperature side because of the cool weather. My diary records do not show the number of trucks hauling the mix, but I believe there were four. I kept

records of load weights and took temperatures of the mix directly behind the paver rather than in the truck. I took these about every two hours. Temperatures, for the most part, were very good. Two of the lowest readings occurred, however, near noon, but the mix was hot enough to lay satisfactorily in the midday.

All operators knew their business, and spreading and rolling were good. The crew and equipment were all furnished by Helms. Ernie Rosholt (western regional paving engineer) and Kr. Tenneson, both of the FAA, arrived at ten-thirty-five, looked things over briefly, and went to the office to confer with Dale Ryan.

Final rolling was not completed 'til about dusk, but that is the usual thing to be expected if the last hot mix is laid just before five o'clock this late in the year. The new runway and taxiway areas on the east extension were paved first, and the paving was finished with a regular paving mix on the apron. The total time on the regular paving was a little less than two and a half days. The same crews and equipment were on the job Friday, November tenth, and Monday November thirteenth.

At about nine A.M. Monday, Dale Ryan and an assistant came out to visit the grade in a low place on the runway. This low spot and another smaller one on the apron were the only places requiring patchings. A load of fine mix (threeeighths inch maximum size aggregate) was brought in about tenthirty, and the two low places were feathered, hand-raked, and rolled. (The word "feathered" applies to what you have to do where you're joining a very thin section of pavement to one that is already laid; it has to be feathered over, raking the fines up next to the pavement, and putting the coarser material in the middle part of the patch, which is deeper.) All paving was thus finished by about one P.M. Monday,

November thirteenth. (That, by the way, was not a Friday, the thirteenth [laughs].)

Only a little piecemeal electrical and concrete work and a seal and screening job on the paving remained to be done. Because of the cold weather, the seal and screens job would be deferred until the first warm weather in late spring, 1973.

There was no work on the project November fourteenth and fifteenth, but on the sixteenth, electricians arrived and regulated a light sensor to turn on and off the runway lights and the VASI system. (Again, the words for which the four letters in VASI stand—visual Approach Slope Indicator.)

There was no further work until November twenty-first when a Harker and Harker crew poured concrete for five cable directional slabs; this shift lasted from seven A.M. 'til four P.M. Larry Trigerro and Dave Love were to do the drop inlet work—needed some elevations. I sent word to office, and a survey crew of three arrived and staked out grade; thus the top of the drop inlet was established at about a foot below the present surface of the ground.

There was no more work for me on this project until May eighth and ninth, 1973. At that time, 7,300 gallons of IRS-1 seal was spread over last year's paving, plus the paving on the old runway, which had been built several years before. The freshly placed seal was covered with quarter-inch screenings (that is, quarter-inch maximum size) and rolled. The spreading of seal and covering by screenings was done as near concomitantly as possible. The screens should be applied immediately behind the asphalt distributor before the asphalt would cool. The entire job was thus finished in May, 1973.

(There is one more remark which I might refer to: before the sealing was done, there were a couple of "bird bath" areas in the parking area, and those had to be tacked a

little bit and some quarter-inch mix placed over before the final seal was put on.)

On November 27, 1972, there were a number of more or less minor tasks remaining; and eight such tasks were enumerated and described by me and turned in to Dale Ryan. I made a copy on two stationery sheets which were turned over to place in the University of Nevada files. Also for the files is a copy of the progress payment Number 4. This shows all twenty-one of the items with attendant quantities in unit costs, and the percent completion at the time of the report, and the actual amounts paid as of December 4, 1972. In addition there is a handwritten set of notes on electric pay items and a sketch relating to bid item Number 16. (This is included just as an example of some of that work; it certainly does not cover all the electrical work.)* I do not have a copy of the final report for the entire job, as that was made after I had left.

I must tell something about Dale Ryan. I interviewed Dale, and found he was born in Reardan, Washington state. His parents live there on a ranch, and Dale was raised in a ranching and farming environment. It was there that he learned to enjoy horses and horseback riding. He attended the Central Grade School and high school in the Central High School. Dale had two and a half years of regular college in 1960 and 1961 at the East Washington college of education. While he did not graduate, he has attended many other colleges, such as junior colleges and the Carson college [WNCC], taking special courses nights in subjects of interest to him and of value to him.

Before attending college, he served three years in the U.S. Army, and he also served in the Marine Corps in 1956 to 1959. After leaving college in east Washington, he worked as a regular civilian worker in 1962 and 1963 with the Corps of the U.S. Army Engineers

in hydrological surveys. This was done out of the Portland, Oregon district office. In 1964, he worked as a surveyor and construction inspector on a sewer project for the city of Lake Oswego in the state of Oregon.

In 1965 through 1968 he was with the city of Red Bluff, California as assistant city engineer. He spent 1969 and 1970 as design engineer on a sewer project for Spokane County, Washington. He moved to Carson City in 1970, where he became assistant city engineer. That was his title in 1972 when I was inspecting the Carson airport extension and parking apron. Since that time, Dale has been advanced to deputy public works engineer.

Dale and Mrs. Ryan have two boys and one girl. The boys are older and in junior and senior high school. Bonnie, the daughter, is about six years old. Dale has served in various capacities in youth work. For ten years, he was advisor and scoutmaster with the Boy Scouts and worked with Cub Scouts, as well as with the regular Scouts. Both Dale and Mrs. Ryan help with 4-H activities. His hobbies have to do mostly with outdoor activities. He is an avid horseman and is a member of the Fuji Park Horsemen Association. He enjoys hunting and fishing and gardening.

Dale has done an excellent job on his assignments as an administrative and working engineer for Carson City, according to my observations and contacts with him. He has handled his work very well in all respects during these growth outbursts in Carson City, with the attendant myriad of problems and their solution.

Dale was chief assistant to [James A.] Rankin, who was the city engineer for several years, until [Jim] resigned in 1972 to go to Minden as Douglas County engineer. Paul

*See Little papers, UNR Library

Lumas replaced Rankin and took over about the time I started work on the airport. Ryan, however, was left in full charge of that project, and I made all my reports out and sent them to Ryan.

Going back to 1972, my daily diary book did not receive notes after November twenty-first. As I recall, however, we spent Thanksgiving again in Stockton with daughters' families. My seventy-second birthday was December ninth, but I have no notes stating how we celebrated; we probably had dinner away from home. Christmas Eve, as I remember, was spent with Bob and Marian Arkell at their home at a dinner attended by other guests also.

I'll have to tell a little bit about Bob; I can't remember whether I described him as one of the Highway workers or not. Nevertheless, I'm gonna say a little something about it, even though it's repeating. He worked for the Highway Department and for the laboratory as our tester—or head tester—down at the Las Vegas lab, and then he wanted to come to Carson, and we put him on in charge of the materials survey crew. But later he had other employment, and he was an inspector on construction in the Reno area—I believe he did that for the power company—and finally he became a surveyor with the Sierra Pacific Power Company.

Marian Arkell has her master's degree, and she's one of the, let's say, "hot-shot" teachers in Carson City. She handles special cases which some of the other people are not qualified to handle.

Bob's hobbies are rather numerous, and he changes them from time to time. He likes wildlife. He's got some pet skunks—he hasn't made them pets; they were just there, and he has treated them as pets, and they don't bother him odorwise. And he has cottontail rabbits

around his home. He doesn't landscape his place except to plant cactus or other native plants. He likes to have the rabbits running here and there, and he gets plenty hot under the collar when somebody shoots at a rabbit or sends a dog in. His own dog is trained to not bother those pets. He also likes to throw feed out to the various birds all winter. He also has fishing and hunting hobbies, but as he got older, he doesn't do as much.

He became interested in plastics, and he finally perfected methods of putting small insects in plastics and doing an expert job. Such things as, oh, scorpions and even small snakes and spiders of various kinds. He tried to use bats, but bats have too much body to do a good job; however, he did manage to make two beautiful bookends with a bat with wings outspread in each. And he succeeded in putting a duck head in. But a large snake or an animal with the whole body does not seem to work well in plastics.

One specially artistic creation was this translucent, plastic toilet seat for his wife's room. It was a near perfect job of preserving about a dozen scorpions in the clear plastic. I believe it was a special occasion of some kind—birthday or anniversary—when he affixed it in place and had her observe the gift for the first time. It has made quite a conversation—or rather, exclamation—piece with lady house guests, especially on their first encounter with it! [Laughs] That's Bob for you!

There was a dearth of notes in my 1973 diary from January first 'till March tenth. Apparently we stayed in good health this particular year in January and February and March [laughs]—unlike our 1972 experiences!

My first 1973 entry states that on March tenth, I planted tomato seeds in pots and

placed the planted pots in the north bedroom window. On March eleventh, I prepared seed bed soil by screening garden loam and adding screened sand and peat moss. This mixture was placed in my electric heated hotbed and was then disinfected with eight gallons of water containing two tablespoons of special disinfectant. It was then ready for planting.

Planting did not take place, however, 'till March sixteenth or seventeenth. Annuals and some perennial flowers and tender, slow-maturing vegetables, such as tomatoes, eggplant, and peppers, are started that way. Our Carson City growing season averages about a hundred and twenty days. The average date of the last killing frost in spring, according to accumulated records, is May twentieth, and the first killing frost in fall is September twentieth. I have seen spring frosts, however, in late May and in June, and early frosts in last week in August or in early September.

The testing department of the Nevada state Highway Department has been the official u.s. Weather Bureau and keeper of records for Carson City since 1926, although the Highway Department testing lab did keep records, ever since 1919. The Sierra Pacific Power Company was keeping the records just prior to 1926. Fred Frisbie operated the gas works, which was owned by the power company, and that was abandoned about the year we took over the temperature readings. The records for Carson City actually go back to the year 1875, and I don't believe any years have been missed since that time. The average annual rainfall is a little less than ten inches. It has been as low as about five inches and as high as nearly twenty-three inches.

People who are avid gardeners in Carson City sometimes set their tomato plants about May fifteenth under hot-caps, which will protect tender plants from freezing when

temperatures drop to around 28 or 29 degrees. The minimum temperatures in mid-May do not stay below freezing for more than an hour or two, and usually between five and seven in the morning. A temperature of 28 to 32 for a period of three to five hours would probably damage plants under the hot-caps.

On March seventeenth I took a bouquet of daffodils to Bonnie Reid, a retired state Highway employee, as her birthday was March eighteenth. I also took one to Estelle Box, also retired but laid up by a leg injury. Bonnie Reid was famous as a long-time Sunday school teacher in the Methodist church. As a matter of fact, the first year I taught school at Carson City, I thought I better do something like that, and Bonnie roped me in, and I taught Sunday school. The Methodist Sunday school building, which was just put together about two years ago, bears the name of the Bonnie Reid Building, and rightfully so.

Estelle Box is the widow of Charles Box, a former Highway Department employee. At the time of his death about twenty-some years ago, he was assistant to the chief accountant. Charlie Box and ex-Governor Fred Balzar worked as trainmen in the old Keeler to Nina narrow-gauge railroad that connected with the broad gauge at the southern end of Owens Valley. It then stayed on the east side of that valley all the way to Laws and on to Nina, Nevada to where it met the broad gauge again. Oddly, all the main towns were on the west side of the valley— Lone Pine, Independence, Big Pine, and Bishop—but all had little railroad stations to serve the towns over on the east side.

I furnished a good many daffodil bouquets to offices where I have worked and to many neighbors. I purchased several dozen of the John Evelyn hybrids about 1952, and in twenty years they had multiplied to many hundreds. In the late summer and fall of 1975,

I dug them and cleared away grass which had taken over the flower beds. I gave away about three thousand of them. Some fifteen hundred I delivered to Gino Lencioni, who was in charge of the capitol grounds where he had them planted. He asked me also if I could give him some Bells of Ireland. I asked him why. Well, he wanted to plant them next to the office of our governor 'cause he is of Irish descent. I could not help him out until this spring because the Bells of Ireland are annuals. Some of them go to seed and volunteer, and I think I gave him about three dozen. I haven't gone down to the capitol to see how the thing looks.

Going back to 1973, my garden was pretty well planted by about May twentieth. I played with the Reno Municipal Band in the customary Decoration Day concert at the main cemetery, but early that morning, Mrs. Little and I decorated the graves of the Fairleys, her father and mother, in the Carson cemetery. We also went over to the Catholic cemetery and decorated the grave of Mrs. Helen Geis—she sold us our first house way back in 1930, and we were very fond of her.

May thirty-first was a real rainy day. It rained almost continuously from nine A.M. 'till about four P.M. We drove to Lake Tahoe in the rain and had lunch at Harvey's. We were not celebrating anything particular; we just did.

KINGSBURY GRADE GAS LINE

In late May, I had been contacted by [Jim] Rankin (Douglas County engineer), who wanted me to inspect several Douglas County jobs. The first one would start early in June. It had to do with repair paving of the trench on Kingsbury grade and Benjamin Avenue, which had been put in by the Southwest Gas Company in November of 1972. At the time this

trench was put in, it was put in the main road, of course, beginning just below the firehouse at the top of Kingsbury grade on down to, oh, within about three hundred feet or so of U.S. 50 down by the Lake, and also it connected up with a line which was found up on Benjamin Avenue, which ran from near the firehouse at the top of Kingsbury grade in a southerly direction. This was done so late that, although the backfill was pretty well compacted, the paving didn't look too good. Some places it was quite bad. I imagine some of that backfill might have been snow, and of course, after it melts, there's not much left [laughs].

Bing Construction, whose headquarters were located in the southerly part of Carson Valley, would be the contractor. Actually, this was a Southwest Gas job, but I was to receive my pay directly from Douglas County, which would be reimbursed by the gas company. Of course, Douglas County built the Kingsbury grade; they did not build Benjamin Avenue. That was built by the Kingsbury Improvement District. Therefore, Douglas County would have quite a lot to say about what happened on the Kingsbury road. (It was not a state highway, by the way.)

This project was known as Southwest Gas Number 23-1259-67. This Kingsbury and Benjamin trench job lasted from June—about June seventh—'til July eleventh. There were twenty-four daily reports. The first reports, of course, do not necessarily cover construction work, but I'm going to take the reports I have made out and attempt to quote from them. Some cases where the carbons were rather poor, I have had to fill in the words, and perhaps invent a few that weren't there originally.

Report Number One is dated June seventh, 1973, and it relates, of course, to the Kingsbury trench. In accordance with a telephone call from Bing Construction

on June sixth, the meeting at Kingsbury firehouse was called for one o'clock June seventh between the contractor, Southwest Gas, and the writer. I arrived at the firehouse just before one P.M., and two foremen for Bing, Al Ashby and Bill Carlson, arrived about one-thirty. Walt Russell, manager for Southwest Gas, arrived around two P.M. Bing requested marks be made on either side of the trench to aid in cutting. Walt Russell stated that Clayce Hummel, one of his employees who was on the job at all times when the pipe was placed and covered, would do the marking, as he knew exactly where the line was in place. I agreed to accompany Hummel on Friday, June eighth. Bill Carlson said Bing would probably want to start cutting trench Monday, June eleventh, and would call me Saturday or Sunday. Hot mix, state specification for three-quarters maximum size, using penetration grade asphalt 85-100, with about six and seven-tenths percent of it, would be mixed and used, according to Carlson. The contractor's men left after a brief conference, and I spent one and a half hours or so, going over the job with Mr. Russell of Southwest Gas. I now quote from report Number Two, June eighth. I met with Walt Russell and several of his employees at Southwest Gas plant, south of Carson City limits, at eight o'clock. Clayce Hummel was introduced to me and secured several cans of red spray paint (the color requested by Bing's men), and we drove via Clear Creek grade to the beginning of the gas line below the firehouse on Kingsbury. I accompanied Hummel on foot; he did the painting. Some areas were in rather bad shape—one in particular, where there had been water trouble late in the fall of '72. This particular area was not marked because it appeared to need attention by the county, a matter I would look into with Jim Rankin. Jagged areas and pull-

away cracks, which apparently were the fault of the gas company, were placed within the area to be cut. Hummel was quite liberal in his marking. Some areas were but little disturbed, or within the pavement—that is, those areas which were entirely within the pavement were little disturbed. Due to some trouble when the trench was near the shoulders, jagged edges would occur, and it would place a proposed cut area wider than you would ordinarily think. One area was so bad that it was omitted entirely, as the gas line was mixed up too much with some of the intersections of property owners. Another area would not be bothered at all because it went across country and dodged a long, roundabout curve. All the crossings were marked with both inside and outside marks. In the afternoon of Sunday, June tenth (now this is report Number Three) the writer visited Douglas County Engineer Jim Rankin, at his home and discussed some [of] the problems on the job. Also we agreed on the pay and mileage for the inspector; it wouldn't make me rich, to be sure, but I didn't have anything else to do. It would be \$6.50 per hour and twelve cents per mile for the car. The mileage was to be figured from the Clear Creek intersection of U.S. 50 with 395 and return to the same point—did not include Clear Creek intersection to Carson City.

On Monday, the twelfth, the writer arrived at the beginning of the job just below the firehouse at eight A.M. and waited for two hours before anyone from the contractor's crew arrived. Phone calls were put in at the firehouse to the engineer's office in Minden and to George Dangberg's office. (George was county field superintendent.) Both were out at the time. Later, Foreman Bill Carlson arrived and said it would be a while before they could get the flagmen—that is, the two flagmen who would watch traffic for us—but they did arrive around eleven.

Carlson and I disagreed as to how the line was to be cut. Carlson said he would cut a straight line in all cases, and my instructions were to remove all faulty, bad places, whether or not there was a straight line there and—that is, all faulty places where the trench was dug by the gas company. We decided to call all parties concerned for a meeting at the Minden courthouse. I called Jim Rankin from the Southwest Gas office at the foot of the Kingsbury grade. Jim agreed to have George Dangberg there, and the meeting was to be at one-thirty P.M. I called Walt Russell, superintendent for Southwest Gas, and he agreed to be there.

The meeting was attended by all parties concerned, and it was agreed that the cutting would be by a cutting wheel attached to the blade, and as nearly as possible in a straight line with blobs and cracks caused by the gas company outside the fourfoot area to be cleared by hand tests. Very narrow cuts at the edge were not to be bypassed in the same manner as the wide strips, but would be bladed in at an angle, as explained by George Dangberg.

During the morning I was visited by Fire Chief Joe Gillie, who stated that Benjamin Drive was not a county road, but the responsibility for that particular road was the Kingsbury Improvement District, and any trench digging or reconstruction had to be taken up with them. This was news to me at the time, and apparently also to the others. Apparently area agreements would have to be made with the improvement district for the work on Benjamin Drive. The contractor's foreman stated that we would continue at eight o'clock tomorrow, June twelfth.

Accordingly, I came up to the job at that time Tuesday, and we decided we would examine the bad spots, where the water trouble was to blame for the real bad

condition. The contractor planned to do all of the cutting before paving. That was agreed to because it would seem he could do that and have it all done at one time—at least that was the agreement that particular date.

In reference to methods of cutting with a disc where the gas line was very near, or at the edge of the traveled way, it would be necessary to make only one cut. The backfill of paving would be bladed in and at an angle, as explained by George Dangberg. Because of the fact that Benjamin Drive was not a county road, as explained to us by the fire chief, Joe Gillie, the marking and cutting and paving of it would not be done on Benjamin until all the Kingsbury trench was finished. Arrangements would have to be made by the gas company with the Kingsbury district before we started work up there.

Carlson, the contractor's foreman, stated that we would commence work on Kingsbury at eight A.M. tomorrow, June twelfth. George Dangberg said he would be on the job Tuesday also, and we would at that time examine those places which were in bad condition, caused by water trouble. The contractor planned to do all cutting on the Kingsbury section before paving—at least that was his plan originally.

Report Number Four covered the work done on June twelfth. I arrived on the job at seven-thirty a.m. and found the contractor's crew already on the job with the Caterpillar equipped with a cutting disc. The crew consisted of two foreman, Al Ashby and Bill Carlson; two flagmen to direct traffic; and one laborer. The cutting disc gave no trouble getting through the asphalt pad, but its attachment to the blade was not perfect, and the cut lines were somewhat wobbly. Where the outside cut was eighteen inches or less from the edge of the pavement, the outside pavement mass tended to loosen from the roadbed, thus making a potential traffic

hazard. After advancing about four hundred feet, it was decided by all of us (the contractor's men; George Dangberg, representing Douglas County; and the inspector) that this hazard was too great to do all the cutting before repaving. The traffic hazard would be greatly lessened by cutting only, and excavating for a short distance only, and following closely with the paving patch. Thus, the entire train would be confined to a small area, which could be closely watched by the two flagmen—one at each end—and both of them would be equipped with walkie-talkies.

I phoned the Minden office, and Jim Rankin (the engineer) agreed to this procedure. I also found out by questioning one of the foremen that the chairman of the Kingsbury Improvement District was real estate operator Ken Kjer, whose office was near the Eagle Thrifty market near the westerly end of the grade. (I presume this is a Scandinavian name, but I do not know which of those first two consonants are silent- [laughs].)

I went to the Southwest Gas Company office in the lower Kingsbury settlement and called Walt Russell, the manager of the gas company in Carson City, and gave him our decision, and he agreed that would be proper. A short time later, I called on Mr. Kjer, who would arrange a meeting with the Southwest Gas and would discuss at that time the Benjamin section.

No actual work was performed this date and would not begin until final approval of our plans could be made by all parties concerned. I spent about three hours on the job this day. This matter of handling traffic to insure safety was very important. The Kingsbury district had been built up to the point that there were thirteen gas services alone! And no doubt there were many more houses which were served for their heating and fuel. some other way. Also, the traffic

flow both ways over Kingsbury grade had increased because of the newly constructed grade on the easterly side, replacing most of the old, narrow, steep road with curves which were with very short radii.

The first actual work day was June thirteenth. Weather that day was cloudy and cool with occasional light showers, but not a sufficient quantity to stop work. Personnel consisted of the two Bing men, both rated as foremen—Al Ashby and Bill Carlson, one equipment operator, two flagmen, and four laborers. Carlson also ran equipment—a blade and a roller. The equipment consisted of one five thousand-pond Hyster roller, a one and a half-yard Allis-Chalmers Loader, and one ten-yard dump truck. Work had begun at seven-thirty A.M.; however, I did not arrive on the job 'till seven-forty-five, as I had been told work would begin at eight.

Cutting of the asphalt paving on both sides of the trench laid last November was done far enough from the beginning of the job at the Benjamin intersection, going downhill westerly, to handle the day's repaving. The cutting was done by a disctype cutter attached to the blade of the grader.

The next operation after cutting was removal of the paving material placed over the gas line trench last November and stockpiling it on the south side of the highway. The backhoe was used for this operation. Actually, the cold November weather at the time the paving was placed can be blamed for the poor job. Had all of the operation been completed in warm weather, there would be no excuse for the rough, and actually miserable, appearance of the trench surface. The job paved so late was hurried to keep ahead of probable snow cover.

After ten-thirty A.M. the dump truck followed along, and the waste material was loaded into it, then hauled to the waste dump, which was located at an old mill pond site

partway down the grade on the northerly side of the main road. The new paving material was hauled in by belly-dump type of trucks with trailers sometimes—sometimes this trailer was attached; sometimes they did not have the trailer. Five such double loads were used to replace the bad paving removed this date. The paving material consisted of three-quarters-inch maximum size aggregate mixed with 6.7 percent asphalt of consistency designated as 85100 penetration. (I had better explain that. The consistency of paving asphalts is measured by means of what is called a “penetration needle” of a certain length, and all diameters up and down change every tiny fraction of an inch. This needle is weighted with a hundred-pound gram weight, and it is allowed to penetrate for five seconds, and the distance it penetrates is measured, and the average of four such penetrations is taken as the consistency—penetration hardness—of the asphalt. The real hard asphalts, which are not used much any more, are the 40-50 grade, 50-60 grade, 60-70. Most hard asphalts for paving are now 85-100 grades or sometimes 100-200 grade. After that they become semisoft asphalts and become graduated into the heavy liquid asphalts, which can be heated up and sprayed directly onto the gravel in road mix operations. This particular asphalt was one which is usually used, and a percentage 6.7 is rather a high percentage, which is well to use, especially in a cold area where there’s quite a lot of water. Many asphalt pavements can be successfully laid in warm climates with as little as five and a half or six percent asphalt.) All paving materials were furnished and prepared by the Bing Construction Company at their hot plant south of Minden. Their hot plant was set right up in the gravel source, which they had developed.

The hot paving mix was bladed into the trench (after it had been dumped in the

windrow) so that the loose material projected about one to two inches above the trench surface. It was then subjected to compacting by the five hundredpound Hyster roller, and trimmed by the blade where too high, and more asphalt mix was added by hand shovel where the compacted material was too low. The raking and compacting was more or less a continual operation, because it was very difficult to get a perfect fit with the surface of the new paving and old paving. When you can see when it’s rolled first time that it’s going to be a little high, the raker has to get in there and pull some off, or if it’s too low in spots, the man with the shovel puts some more on; and it keeps working back and forth like that until after good rolling, the pavement is practically the same height all the way across. Trenching and repaving of a trench is always a irksome, mean, ornery job [laughing]—you can go all the adjectives you want—but it’s very, very difficult to fit it exactly into the original pavement, and this poor Kingsbury road has been subjected to a lot of that. (The poor road doesn’t know that at the present time, but in about two years there’s going to be another big pipeline put right up there which will carry effluent from the sewage plant, which covers the entire distance from Round Hill to Glenbrook. That will mean another trench which has to be well compacted and retreated with asphalt.)

Trench widths varied considerably because of driveway areas to adjacent residences, and because of variances of width due to bad areas. The average width of the replaced paving for this first day’s lay-down was approximately five feet. Nine hundred and fifty lineal feet of paving was the total length laid this date.

Carlson and I took width measurements every fifty feet, and we used the “wheel” for measuring longitudinal distance. (I think I have mentioned this wheel and other—in other

areas. It's [an] easy device to use; it registers the footage. The only thing that you have to watch is [to] be sure the wheel isn't jumping, or that you don't have a skip somewhere; one occasionally would get clogged.) This day was rather cool at this particular elevation, and we decided to check the weather and get in touch with each other by phone at six-thirty in the morning, especially if the the storm condition should worsen.

George Dangberg arrived on the job at about nine-thirty, I rode with him over the job, and we looked over the one bad place I had in mind. We decided we would have the contractor place an additional width to cover the worst areas in this bad section, and that he would be compensated for the extra width by the county directly without the gas company participating. It must be noted that the gas company pays for all reworking of the paving over the trench.

We also looked over a wet place on the lower end of the job. This was caused, no doubt, by clogging of drains or by leaks in water mains or in water service lines. This area will need attention by the county before the final overlay is made. As I recall, George Dangberg said he would get his crew, and they would investigate there and take whatever action was necessary to care for it.

We found the thickness of the asphalt paving removed from the trench to vary considerably from three to five inches. Of course, it all had to be replaced by the new paving; thus the contractor would necessarily be paid extra for the extra asphalt mix required. Estimate of cost of this reconstruction was made by assuming a single width (that is, average) and a depth of three inches of new paving. Both of those assumptions were way, way off, being too little.

I found the contractor's two foremen, Carlson and Ashby, cooperative, conscientious,

and they were hard-working men. I am not a purist as inspectors go; when an emergency would arise, or where help would be needed to speed up temporarily around a bad section, I very often grabbed a Number Two shovel and helped the workmen. This seemed to be very much appreciated by all concerned, and the physical labor did not bother me a bit, as I had been in a very good physical condition.

The following day, July fourteenth, it was cool and partly cloudy. Work began at seven-thirty A.M.; crewmen and equipment were the same as yesterday, except that a single belly-dump truck was substituted for one of the doubles. The work schedule was seven-thirty A.M. 'till twelve, and twelvethirty 'till five P.M. It was established this date and supposedly would continue 'till the job was done—at least that was the intention. But this second day limited to eight, instead of nine hours because of trouble with the backhoe. The job was shut down at four P.M.

The asphalt mix upon arrival had temperatures plenty high, but in the afternoon the last load had cooled considerably while waiting for repair to the backhoe, which was the equipment used to dig the trench. Although somewhat cooled, this particular load was finally laid successfully, and both breakdown rolling and final rolling looked good when the job was finished.

There was still trouble confining the trench fill to four feet width, due to variations in quantity dumped by the bellydump trucks. For one thing, ten measurements of the day's work showed an average of 4.7 feet. The total length laid during the day was only 425 feet. Hereafter, more care would have to be used by dumping from the belly-dump trucks; however, the blade can be used to drift excess material to areas which show shortages. But in no case can exactly proper quantities be expected in all areas without a considerable

amount of extra work by the blade and hand labor.

Walt Russell, superintendent for the Southwest Gas Company, was on the job for a short time, as was Mr. [D. Gerald] Bing, Sr., the contractor. I had known Mr. Bing for many years. He started out in a small way in Douglas County quite a number of years ago, and he was a frequent visitor to the Highway laboratory, getting suggestions as to quality of materials in the area and suggestions as to asphalt quantities. He was not alone in doing this; practically all the contractors did the same thing.

Both Walt Russell and Mr. Bing thought the job looked good, but Mr. Russell, whose company had to pay for this job, expressed concern over variations in width of the patch. We would try to keep to the four-inch width as much as possible; however, there were some areas where extra close control of width is impossible. These are places where the gas line is placed too close to the edge of the highway shoulder, also places where the paving is so poor that extra breakaway has to be repaired. When the trench is placed too close to the edge of the highway, most of that material outside of the trench will break away and will have to be replaced.

Added to the problems this date was a cattle drive of 250 head over the partly finished construction area, which caused extra repair work. Extra heavy auto traffic also slowed construction to some extent. I made a trip during the slowdown to the dump area in the dry lake, where waste paving was being dumped. The local county maintenance crew was there using a loader to push the debris aside, so the dump truck could unload directly into the lake bed. This pond apparently had been used many, many years ago when the big timbers were being cut and sawed up for sale to the

rapidly growing Virginia City area and other adjoining areas.

Tomorrow the county men will set up their own control on the east side of Kingsbury grade near the summit, so the waste paving can be used for fill in some of the bad areas over there. In that case, the loaded trucks will cross over the hill and dump over there instead of going way down to the pond area.

The third work day, June fifteenth, started at the regular hour, seven-thirty A.M., but lasted until six P.M., due to lateness of arrival of the last load of paving asphalt. Such material cannot be kept over 'till the following day, as it would cool off overnight. Cooling of the hot asphalt mix below 1600 makes it near impossible to lay and compact satisfactorily. Thus all late arriving loads must be laid, or the entire load is wasted.

Checks of length and width of today's lay-down were made, and the total length was 885 feet. Average width was 4.2 feet. Depth of the old pavement varied from four inches at the beginning of the day's work to about two inches depth at the lower end where we finished [laughing].

Butch Carlson took pride in having a good-looking finished job; therefore, he personally supervised the unloading of bellydump asphalt trucks, and he did a considerable amount of leveling the uncompacted mix with a hand rake. Rolling progressed well—both breakdown and final rolling. The crew did cleanup work immediately behind the breakdown roller. Edges of paving the trench had to be painted with liquid asphalt to secure a good bond with the new trench material. This ordinarily is done with a spray machine; however, this type of spray apparatus cannot always be used. In fact, the apparatus the contractor brought into the job broke down temporarily, and the old pavement along the

trench had to be primed by hand-brushing with liquid asphalt.

George Bratovich accompanied the trucks which unloaded our paving refuse in areas needing fill material on the east side of the summit. He had the special traffic control men stationed there.

Monday, June eighteenth, was not a work day. I received at six o'clock in the morning a phone call from Butch Carlson stating that several of the crewmen had become ill over the weekend; thus they would not be able to operate shorthanded. That word "ill" could have several implications [laughs].

Work started at seven A.M. Tuesday, June nineteenth, and it was a long workday, ending at six P.M. Personnel and equipment were essentially the same as last Friday. Today's work was relative 970 feet of repair trench with an average width of 4.7 feet. Extra widths were unavoidable because, as I said before, bad places in the roadway.

George Dangberg, county road foreman, arrived in the morning, and we examined the area that looked so bad that had not been marked for excavation widths. It looked like much more should be done in this area than simply repairing the gas trench. George suggested that the contractor do the extra widening, and the county would pay for the extra width. When this was discussed with Foreman Butch Carlson, he did not want to do any more than was required by the gas company, and I did not blame him for refusal to take on what would amount to a major repair job on a county road. In the resulting discussion, it was brought out that further trenching of the Kingsbury highway west of the summit would be necessary when the sewer main, leading from the Round Hill [laughing] treating plant to the Carson River was laid. At that time, the extra work on the bad area could be done. George Dangberg

more or less agreed, but stated the county was faced with a seemingly unending repair job because of water spots causing frost boils. These had to be dug out and drain rock placed and the water led away by installation of subdrains and the holes filled with good gravel and the road repaired.

He later showed me a water problem further downhill. Although this had supposedly been repaired, the drains must have plugged, or a water line was leaking. We agreed to examine this area more thoroughly when the gas trench is opened, and will then be in better position to find the real cause of the trouble and recommend treatment.

Again, it was almost impossible to maintain a four-[foot] width. In fact, some breakaway places and bad private driveway areas brought the average width to 4.7 feet. Paving in the main roadway in this section also was quite deep, being three and a half to almost five inches. The thickness in the trench had to be practically the same as the adjacent paving to give similar load support. Workmen did a good job this date. Practically all construction required a lot of handwork.

Wednesday, June twentieth, started off with a noticeably cool morning but soon changed to a very warm midday with scant cloud cover. Workmen complained about the heat. Equipment and work crew were about the same as yesterday.

Some mention of the ages of these crewmen should be made. The two flagmen were high school boys in their teens, and the two laborers were young men in their twenties. The two foremen were in their late twenties or early thirties, and the equipment operators were older men—I would say thirtyfive to fifty. Of course, the inspector was seventy-two at the time [laughs]. The backhoe operator was very good, the laborers fair, and the high school boys did a pretty fair

job of directing traffic. The two foremen were working foremen, and they did most of the hand-raking, and sometimes they operated equipment to do a particularly difficult task. Working hours this date were seven A.M. to five P.M., but it was always understood that variations would be necessary depending upon breakdowns and upon late delivery of paving hot mix.

Lunchtime, that is, the half-hour lunchtime, is not always exactly at twelve o'clock 'till twelve-thirty. When a load of hot mix would arrive between eleven-thirty and twelve, the entire load is laid, raked, and given the breakdown rolling before stopping for the one-half hour lunch. I have seen this happen many times, and lunch was often delayed 'till quite a little after one o'clock.

Eleven hundred and twenty feet was the length of today's lay-down with an average width of 4.4 feet.

June twenty-first was a ten-hour day, seven A.M. to five-thirty P.M., with personnel and equipment about the same as usual. Laborers were becoming more accustomed to duties required of then; thus they were slowly becoming more adept, thus putting forth more acceptable finished product.

There had been some near misses but no accidents thus far, in spite of heavy traffic and necessity to direct it over one lane only, for a few hundred feet. Some problems were caused by entrance and exit to and from side roads. Heaviest traffic was [during] early and late times of day but was quite heavy all day. Work this date was done as well as could be done under the conditions. Places in the roadway showing bumps and depressions were encountered and would need further repair, and shoulder material would have to be bladed against the paving edge before the job could be accepted. Work this date ended just below the restaurant and bar on

the north side of the highway. A hundred and twenty-eight-foot section of trench with an average width of 4.7 feet was completed this date.

June twenty-second was another long work day, finishing at six P.M. The length of paving was 1,028 feet also, and the average width again 4.7 feet. This date there were some breaks—or rather, skips—in the trench repair. One such skip of 385 feet was due to the gas line cutting across country in the easement, where the roadway made a long, looplike curve. The other skip was in the dike area below the restaurant. Waste from the trench was still being hauled across the summit, and would be until the county were sure they had enough material over there.

One woman stopped her car and complained to me about the road condition at intersection with the Timber Road. She was imbued with vehement language consisting of some choice words, usually unprintable. I referred her to George Dangberg [laughs].

One of the county maintenance men had shown me the place, wondering why we did not open the trench there. I told him the gas company did not want that particular section of trench opened, as it had been well paved with hot mix and looked better than the adjoining county paving. The maintenance man then said the county would make repairs, and as I recall, I told him that was a matter for the county and the gas company to settle, as I was given explicit instructions by the gas company to skip the area.

On Monday, June twenty-fifth, we started work in a comfortable cool morning, which rather rapidly changed in character to a hot day—that is, considering elevation. Our working time was again seven A.M. to six P.M. with the usual half hour for lunch—again a ten and a half hour day with two and a half hours of overtime.

We completed this date a section 1,180 feet in length with an average width of 3.95 feet—might as well call it four feet. That was the first time we succeeded in making the originally specified width, and last time, as I recall.

The contractor's crew was a little late in arriving, and initial work was hampered by some minor mishaps. The bitumen pot (called for short the "bitch pot"), which was mounted on a rubber-tired rake, had a flat tire. Of course, it had to be moved along to keep pace with progress of the work.

In one place where the blade was used to help spread the windrowed hot mix, some alligatored pavement in the middle of the road was accidentally lifted, and the area affected had to be patched with some of our hot mix. That term "alligatored" is a very fine term for the looks of those kind[s] of places where the pavement, as it gets old, sort of cracks and looks like the back of an alligator.

Walt Russell, manager of the Southwest Gas, arrived on the job about eleven-fifteen A.M. for a rather brief inspection. He complained quite vehemently about too much width and too much thickness of the new pad. I tried to explain to him that at this particular time we were in what was probably the poorest pavement on the job. The backhoe had dug a little too deep, and the workmen had not yet had time to fill in the extra depth by hand-shoveling. I tried to explain to him that a very real problem's encountered in attempting to do satisfactory patching on an old pavement. He was in a hurry and left the job in a somber mood.

That evening at seven o'clock I phoned him, and found him in a better mood to accept an explanation. I told him that there was always an overrun in time and materials in attempting to do good workmanship on a patch job. Variations in thickness had to

be expected, as no mountain job of original paving could be perfect. Width of the trench was also very difficult to control on account of breakaway encountered at the edges of the trench. Any asphalt which was broken away had to be replaced. This was especially true on old, hardened asphalts on the old roadbeds. These rough edges had to be filled, of course, with fresh, hot asphalt mix; and the purchaser, of course, had to pay for the extra mix. That was one of the conditions of the job.

After my explanation, Russell conceded that I had given him sufficient explanation to further understand the problem. The two young foremen, Ashby and Carlson, I explained to him, were doing their best by carefully hand-raking and carefully observing the compaction by rollers. Really, under the conditions encountered, no better job could be produced more economically. I also told Mr. Russell that about eight tons of free asphalt mix was placed on his job at the end of the day. A bobtailed truckload from Bing's plant, intended for another job, could not be used there and was unloaded and used on the gas trench. That should have made Mr. Russell a little bit more happy.

Tuesday, June twenty-sixth, was cool in early morning but rapidly developed into a very warm day, as the days were doing. Crewmen and equipment were the same as during the last several days. Work contemplated this date did not quite get finished, but we did manage to do 826 feet. our working day was a good ten hours. The width, however, was still over four feet, averaging 4.4 feet this date.

Heavy traffic from seven-thirty to nine A.M., and again from noon 'till six P.M., had a tendency to slow progress. There was one bad car accident, but occupants were not badly injured, as all had seat belts secured. This happened quite early in the

morning. These four young men were in a small car, and the driver lost control. The car turned upside down after hitting boulders alongside the road. They were really lucky to have received only slight injuries. The car appeared to be totaled out. Luckily there was no opposing traffic coming uphill at that particular time.

June twenty-seventh was a moderately cool day until late afternoon due to the cloud cover, but there was no rain. Crewmen and equipment were the same as the day before, but progress was somewhat slowed by the fact that Bing was furnishing Teichert Construction with part of the production from his hot plant. We received only three loads of hot mix and were thus limited to a lay-down of only 638 feet, which averaged just about four feet in width.

There was some trouble with the Hyster roller, and considerable time was required to make repair. Bolts were lost from the housing casting, and a trip had to be made to supply house to replace them. Extra wide variations were found in thicknesses of the original trench paving. The day's work ended at Juniper Drive.

June twenty-eighth was similar weatherwise to the other days of the week. Working hours were seven A.M. 'till five thirty P.M., during which time 753 feet of trench was repaved with an average thickness of 4.8 feet. The rather short spread, which utilized all of four large belly-dump truckloads, was influenced by having to meet the same thickness that was in the old trench. The first 150 feet of this work showed as much as six inches of paving. The balance was quite variable—four to six and a half inches.

At nine A.M. I went to the Southwest Gas office on lower Kingsbury and put in a phone call to Superintendent Russell at Carson headquarters. I wanted to talk regarding

to the marking of Benjamin Lane, which carried the gas line for about three miles before intersecting the Kingsbury grade. (The road is that long, but the gas line did not extend near that far.) I stated previously, Benjamin Lane was controlled entirely by the Kingsbury district rather than by Douglas County. The bookkeeping and payments to the contractor and the inspector would be [the] responsibility of the district.

Russell stated he had no one available to do the marking at the moment, but would have a man available a little later. I told him the contractor was rather anxious to have the gas trench outlined as soon as possible, as the Kingsbury project was about to be completed.

Russell appeared on the job in the afternoon and told me he would have Clayce Hummel go over the job with me Friday morning. I also arranged for the county people to be present to make decision regarding the area omitted at the Kingsbury logging road intersection.

Butch Carlson said he would want to make the cuts Friday at six o'clock in the afternoon. He would not be free to do so 'till that time, as the contractor had taken Friday to do a job on the California side of U.S. Highway 50. All tools and equipment belonged to the contractor, and, nevertheless, the county should be apprised on the start on Benjamin, as they wanted to inspect the Kingsbury job for acceptance before releasing the contractor.

Friday, June twenty-ninth, there was, of course, no paving on Kingsbury, as the Sing people were busy elsewhere. I met with Clayce Hummel at the Kingsbury office of the gas company, but in the meantime, I had notified George Dangberg so that he could be present on the Benjamin job if he so desired, as the county was concerned indirectly with this noncounty highway.

When Hummel and I arrived at Benjamin, George Danberg and the local county maintenance crew—George Bratovich and Ed Court—was with him waiting for us. The five of us went over the entire area to be repaired.

The general appearance of Benjamin Lane was anything but satisfactory [chuckling]. Paving was nonuniform, both as to width and thickness. We later found some of the original paving to be only one inch thick, but we would have to place at least two or three inches of paving over the gas trench to insure serviceable cover. We also found some cave-ins and other bad spots at the upper end. It would be necessary to notify the gas company as to the time the contractor would be excavating at the two critical points. An informed gas company employee would be able [to] point out valve locations on the south end of Benjamin, also at the west end of Kingsbury, where we would probably finish that project early in July.

I assisted in outlining the cutting edges on Benjamin by means of a fluorescent paint spray can. George Dangberg drove with me to Kingsbury below Chimney Rock Lane and showed me where the gas company had torn out the dike last fall. We did not detect the dike when repaving, as it had been mostly obliterated and would have to be replaced to control melting snow and rain water.

Referring again back to the Kingsbury job, Hummel and I, when making the cutting lines, omitted the short section of the logging road because we both agreed that the paving placed by the gas company last November was in much better shape at that point. George Dangberg and his crewmen agreed, finally, and George said the county would do whatever extra work might be needed there.

After leaving the county people, I drove across the California-Nevada state line on U.S. 50 in search of the Bing crew. I had quite

a time finding them but finally succeeded. I notified Butch Carlson that we would finish the marking this afternoon, and all would be ready for his cutting project at six o'clock this date. Butch told me that he would have to change his plans, as he did not have the cutting disc to attach to the blade. The cutting would be done at eight o'clock Saturday morning. We therefore arranged to meet at Benjamin intersection Saturday morning.

Carlson also was informed by me that the dike below Chimney Rock intersection had to be placed. He said a change order would have to be prepared by the gas company. I stated that the best way to arrange a pay item would be to use a tonnage basis rather than lineal footage because in some places the paving would have to be widened as much as two feet before building the dike.

After lunch I drove to the Minden office and left my time and mileage and had a brief discussion with Jim Rankin, the county engineer. Jim complimented me on the detailed reports I furnished, and he said he had never received similar reports previously.

On Saturday, June thirtieth, I drove to Benjamin, arriving a little before eight o'clock. In about twenty minutes, Butch Carlson and two of the laborers arrived with blade and cutting tool attached. We did the cutting according to the marking placed yesterday and finished a little before ten A.M.

Some of the rough places resulting from the cutting operation were temporarily repaired by the laborers; thus south Benjamin should be safe enough for the light traffic it carries at the present time. (My time for the day was two hours and mileage fifty-three miles.)

Monday, July second, personnel and equipment were same as usual except the blade was not in service. It was replaced by a Case Hydro-loader. The regular working hours,

seven A.M. 'till six P.M., were only sufficient to replace 692 feet of trench with an average width of 4.7 feet. The relatively short distance was caused by extra depth and width placed. Apparently the county had overlaid this part of the highway with one or two extra thicknesses in an attempt to keep a good surface. That particular area was subjected to very much heavy traffic, and a thicker pavement was absolutely necessary in such an area.

Asphalt on either side was found to be from five inches to eight and a half inches thick. Although four loads of hot mix were hauled to the job, about four tons of the last load had to be wasted because the trench had not been dug quite long enough, and the backhoe had left the job earlier; and, of course, that meant there's nothing to do but waste the asphalt.

A half-hour delay in the morning was occasioned by necessity to weld a break in the backhoe bucket. In general, however, there were but few delays due to breakdowns of equipment.

Tuesday, July third, the job was slowed considerably because of heavy traffic at or near the shopping center near the end of the job. Also extra asphalt was required to fill what we called "the hole." The latter was a dug-out area around a series of gas valves, and refilling was done entirely with the hot mix, rather than using soil. Again, although the working hours were from seven A.M. 'till five-thirty P.M., only 563 feet of trench was repaved, but the average width was five feet. The 563 feet just about finished the trench repair; it ended at the crossover just below the shopping center. Eleven tons of asphalt paving were placed in part of the crossover and also partly filled "the hole," where about one foot of cold mix had been placed around the valves. Additional material would be needed on the next work day, July fifth.

Thickness of the old paving alongside the gas company trench was four and a half to five inches, except in one area where for a short distance it increased to seven or eight inches.

There was a minor car accident this day, as an elderly couple, the lady driving, tried to negotiate a narrow place between a sign and the ten-wheel truck which was being loaded with pavement waste. Apparently, they had not heeded the flagman. The lady made contact against the truck with her front fender. She did this just as the truck had started to move. I stopped him and had him back up, but damage to the fender had already been done. I took the license number of the car for probably future reference.

Knowing that we would need help from the gas company around the valves, I called their Carson office and asked to have their men on hand about two P.M. Two of the workmen arrived at one-thirty with truck and necessary equipment. About a foot of cold mix laid against the valve last fall had to be removed. Carlson had ordered the eleven tons of asphalt, and we used all of it; but there was only enough to fill the depression. However, by quitting time, one-half of the crossover was made passable, and the other half was barricaded.

I helped the gas company employees check elevations for setting the metal pipe covers, but the job could not be finished 'till July fifth.

There was a question as to responsibility (county or the gas company) to blame material against the new paving at the shoulders. I suggested they meet and make a decision, as it was not for me to give the order. The manner of placing about three hundred feet of dike below chimney Rock was finally resolved. The county and gas company would share the cost, and a change order would be furnished the contractor so that he can be paid for doing

the job. However, the contractor would be unable to do this extra work 'till the week of July ninth to thirteenth.

Work on July fifth was divided between the Kingsbury west end and Benjamin. Total working hours were the usual seven A.M. 'till five-thirty P.M. From seven o'clock 'till ten-thirty, Kingsbury was finished by placing and compacting 612 square feet of mix on the crossover and "the hole." On Benjamin 753 feet of mix, 5.75 feet in width, was placed and compacted.

The gas company crew had arrived on the job early and reset the pipe and covers over the valves, lowering them to approximately one-fourth inch below finished grade. However twenty-four-hour traffic over the finished job pounded the paving down so that the covers were a part of the actual surface. One cover came loose enough to rattle under traffic. This condition would be corrected the following day.

The finish over the hole and the crossing was far from perfect but was the best that could be expected under the constant pounding of heavy traffic, including supply trucks in and out of the shopping center.

The Southwest Gas office people at Kingsbury office, especially the good-looking young lady, Leslie, were very helpful and courteous in relaying messages back and forth and to and from the Carson office.

The county, undoubtedly, would have to improve the situation at the crossover as soon as the high traffic season subsided sufficiently. As a matter of fact, a year or two later the state Highway Department made the big, needed change in that intersection.

The paving on Benjamin was found to be quite shallow at the time of cutting, which was June thirtieth. It varied in the midsection of the roadway from one and a half to two and a half inches thick. Near the shoulders,

however, there was at times scarcely an inch. This was easily broken up also by truck traffic. No attempt was made, however, to build up such areas with deeper paving, because they were outside the areas disturbed by the gas company trench. The district, undoubtedly, would have to make satisfactory shoulder repair later.

The county men, George Bratovich and his helper, visited the Benjamin job several times, although they were in no way responsible for former nor future work there. They were helpful, however, in explaining why conditions in certain of the areas were in the present poor condition. Because of very low traffic, the two traffic boys were given shovels and used as additional laborers on Benjamin. The 753 feet of repaving on Benjamin this date certainly gave a much better appearance to the trench areas.

July sixth was an eleven-hour work day from seven A.M. 'till six-thirty P.M., with one-half hour for lunch. It was the intent of Foreman Butch Carlson to finish all of Benjamin this date, as there was very little traffic to interfere, and the two flagmen could again be used as laborers. Also, the thickness of paving adjacent to the trench was only two or three inches. Thickness of trench asphalt would not have to exceed that figure. Length of the repaved trench this date was 1,334 feet with an average width of 4.6 feet.

George Dangberg came on the job about eleven A.M., and we discussed the shoulder blading and the dike work, which was still to be done on Kingsbury. George was of the opinion that the county should share the expenses of the dike; this would have to be worked out between George and the gas company and the contractor. The contractor will need a change order or extra work order before he could commence the work. This was explained to these people before. The county

probably will in the end do the shoulder blading, as there was nothing in the written contract between the Southwest Gas and Bing Construction covering this item.

I wasn't satisfied with the work done today at the far south end, which was the last section paved in late afternoon. Carlson was not going to do any more to it, and the job was done—the first time he showed an attitude of this kind. Apparently, he was under pressure by Mr. Bing to get this job out of the way.

The last load of hot mix was not enough to cover the full depth and to fill the entire area in the valve section at the end of the job. This area, according to my measurements, was 1,192 square feet. Since the last load of hot mix was short on tonnage, a portion of the above area just beyond the valves was not covered. I told Carlson, as far as I was concerned, the job was not accepted until more had been done on the south end.

I planned to have the county men and the gas company, also the district people, look the area over. It was, of course, in much better condition than before the repaving was done. The ideas of these people, if they could agree, would settle the acceptance question. Plans were made to construct the dike on Kingsbury below Chimney Rock next Tuesday, and surely enough additional asphalt could be obtained to do a better job of finishing the south end of Benjamin.

My next trip to the job site was on July ninth. There was no construction work on this date, but I had arranged to meet with Ed Court and George Bratovich (the maintenance crewmen) at the logging road. They were responsible for maintenance of all the county highways in the Lake area of Douglas County, and I wanted their opinion regarding several areas in the reconstruction jobs, because they are the people who will have to do the work.

We looked over in particular the large area at the south end of Benjamin. The men thought this could be called acceptable; however, the trench along the easterly side of the area would have to be completely redone. If the contractor had not run out of the mix in the late afternoon of Friday, the sixth, he probably could have finished the job properly.

I next drove to Minden to get in touch with Bing Construction and George Dangberg, but found everyone out of reach by phone. The Bing people had a job in California at the south end of the Lake, a fact I did not know at the time I was in that vicinity. So I drove back to Carson and called Walt Russell, manager of the gas company, and asked him to get in touch with George Dangberg with respect to the dike work below Chimney Rock Drive on Kingsbury.

I also drove again to the Lake area and made contact with the Bing people at the Oliver mobile home area. They told me they would make necessary repairs to the trench on upper Benjamin on Tuesday.

I had made particularly strong efforts to get this job completed, and if it were completed, it had to be the way I handled it. There seemed to be quite a degree of lethargy or *laissez-faire* in some of the Douglas County management. (That l-a-i-s-s-e-z f-a-i-r-e is French. But you know sometimes a language has phrases in a different language which give you a better meaning than does the English.)

(I hope I am not putting a lot of excess “uninformation,” as well as information in this dissertation; future readers may be bothered by all of it. On the other hand, if someone doesn't do something like this, how will people four or five hundred years from now know just how we did things in this age?)

To go on with the dissertation, Russell and George Dangberg finally reached an agreement as to sharing expense on the dike

below Chimney Rock Road intersection on Kingsbury. George was to be on the job there Tuesday morning at nine o'clock. Clayce Hummel of the gas company would meet with George and me at that time also, and we would contact Butch Carlson as to price.

At seven A.M. July tenth, I arrived at the construction site at seven o'clock, but Carlson and Ashby of Bing Construction did not arrive 'till nearly eight. They told me that the laborers were at work at the Oliver Court job and would not be available on our job until ten o'clock. In the meantime, I called at the Southwest Gas office and tried to get in touch with their Carson office, as Clayce Hummel had not yet arrived on the job; for that matter, neither had George Dangberg.

About ten-thirty all parties concerned got together. George Dangberg and Butch Carlson went over the dike job with Clayce Hummel and me. Carlson set a price of six hundred to seven hundred dollars for the job, and Dangberg and Hummel agreed to it. They also agreed to have the county and gas company split the cost down the middle. This would entail construction of 360 feet of dike along the northerly side of Kingsbury Road just below the Chimney Rock branch.

Carlson stated that due to trouble having developed in securing lumber for the Oliver job at the prescribed time, his crew would have to stay on the job and work with the lumber, which was to arrive shortly.

I returned to Carson City at noon, but would charge only three hours plus mileage this date. When I think back on this, I sometimes think I should have charged a lot more to the Douglas County because I actually had to run the job from beginning to end.

On July eleventh, we would start work at eight A.M. I arrived at that time, and two workmen, Dave and Dan, were there;

and they began cleaning the dike area in preparation for asphalt mix. The weather this date, typical for a July day at Tahoe, was warm with a few clouds. Personnel consisted of the two foremen, Butch Carlson and Al Ashby; two laborers, named above; and one truck driver who assisted when not busy with the truck. He even took up a shovel and shoveled asphalt mix from the windrow to the dike site. Equipment consisted of the backhoe also equipped with a hydro-leveler, and a ten-wheeler truck. The truck arrived with full load of asphalt mix shortly after nine o'clock.

The dike on Kingsbury was quite carefully constructed. Hand tools were used in placing and partly compacting the hot mix, which was removed from the truck with the backhoe and distributed along the road in a windrow adjacent to the dike area. A hand rake aided in shaping the dike, and it was handcompacted with hand tampers as much as possible, as the roller would tend to flatten it.

This particular project on Kingsbury was completed by twofifteen P.M. George Dangberg made an inspection during the operation and was well satisfied. Three hundred and sixty feet of dike was thus constructed, and water would be directed into a paved basin at the lower end, which in turn would deliver water to a six-inch, corrugated metal pipe already in place under the roadway.

Upon finishing the dike on Kingsbury, the material, crew, and equipment were moved to the southerly end of the paving on Benjamin. This was the part that the foreman said he would not finish. However, the large area in the middle of the intersection at that point was discussed and considered well enough built to drain, although I had originally objected to the rather meager thickness of the new asphalt placed earlier.

The placement of hot mix was to be in the trench on the easterly side of Benjamin. This

was the area which did not receive paving July sixth. Asphalt mix was shoveled by hand from the truck to the trench and leveled with hand rakes and compacted by the Hyster roller. The three valves inside the limits of paving were given more asphalt. The covers were given all the asphalt mix they could take and still keep grade suitable for drainage. This in some cases amounted to not much more than an inch.

This job on Benjamin was far from perfect, but paving over the trench, when finished, was at least as thick as the surrounding paving. The entire Benjamin Drive paving as originally dug is two inches or very slightly more than the average. Drainage was not given much attention when this road was originally constructed, as many places were subject to washing.

At four P.M. the Kingsbury-Benjamin repaving job over the gas line was completed. I had no further work on Kingsbury, but by July sixteenth, I was to inspect several overlay jobs in Carson Valley which had been contracted with the Helms Construction Company; and later I was to inspect paving of the Rancho Estates roads in the new subdivision of that name, located southeasterly from Minden.

At the suggestion of Mrs. Glass, I shall make a remark or two occasionally regarding the purpose of this [chuckles] dissertation. I know it has been a long one, and seemingly to a good many people, a useless one. On the other hand, say, several centuries from now at a time when our fossil fuels have been practically depleted, there may be other means of securing energy for all moving objects and energy for all heating and so forth. What it will be, I do not know. Perhaps there will be some way invented to catch and convert energy from the sun; maybe wave action of the sea can be used, such as the severe wave action along the coast of Maine, if apparatus can be designed to properly gather,

retain, and use this energy; or perhaps—I know likely—and not only perhaps, but actually—energy will be derived from nuclear sources. By that time, surely, safe protective measures will be really the thing. Right at the present time so many people are afraid of atomic power—nuclear power—because of its terrific potential to destroy. However, the human race has invented things as time has gone on, and I am sure that means will be invented and information arranged in such a way that people can understand it to show that safety can be had.

Then those people will look back through records in an attempt to research certain projects. For example, how were these highways which were used for moving goods and people—how were they built? With what kind of machinery? That kind which had to use fossil fuels. That will be as strange to them, perhaps, as it would be strange to the ancient Greeks and Romans to see an automobile rolling down the road. I just mention this because it tends to make a reason for such a long, seemingly tiresome dissertation [laughing].

DOUGLAS COUNTY PAVING OVERLAYS

Between July eleventh, the last day on the Kingsbury gas line, and July sixteenth, I had no inspection duties. I knew that the Helms Construction Company of Reno was to do the overlay paving jobs, and I would do the inspecting; therefore, of my own volition, I decided to make a preliminary check of the Helms gravel production as to source, quality, and gradation, and to check on the hot plant operation, also. Accordingly, on July sixteenth, I drove to the Helms hot plant—that is, the mixing plant—at Empire, east of Carson City. I entered the scale house, which was empty, and I looked around for a

while and waited; and finally John Battcher, the weighmaster, came in. I discovered that John and I had known each other, as he was a former state Highway employee. He had spent some few weeks in the materials laboratory for preliminary instruction and training before [his] going out into the field for the state as a junior inspector.

I was shown the aggregate gradation which had been proposed by Superintendent Carl Wegren. I found it to be unsuitable for the half-inch overlay work in a climate like ours because of the voids in the mix. When such voids are filled with water, which cannot escape below through the dense, graded mixture already in place and which in winter weather will freeze, there occurs immediate degradation. Expansion of the freezing water tends to dislodge the gravel particles, in spite of the fact that the asphaltic coating is supposed to hold them together. To prepare an asphaltic mixture with a minimum of voids, the gravel aggregate needs enough sand and nonplastic soil fines to produce a dense, compacted pavement which is impervious to water penetration.

I wrote a gradation specification for crushed gravel, one-half-inch maximum size, which would contain from thirty to thirty-five percent sand sizes, and with no more than ten percent fines, which would pass a 200-mesh sieve. Battcher said he would get hold of Wegren, the superintendent, and give him the gradation formula I had written.

The asphalt content of the proposed mixture could be adjusted when the hot plant started operating. I assumed from my previous experiences, that asphalt content would be six percent or slightly more for this particular gradation.

I took some time to look over the entire asphalt mixing plant set up, and in so doing, met Claude Willeford, plant foreman, and

Al Wieber, batch operator, and discussed their operations with them. The hot plant was a Standard, which in my opinion's one of the best makes. It had an output capacity of a hundred and fifty tons per hour. It was equipped with necessary accessories, such as screens, fired drier, fuel, and asphalt storage tanks. I was told by Willeford that the Douglas Oil Company would furnish the asphalt for the job. (Douglas Oil Company was a producer of asphalt for many highway jobs, and their product had been approved by me a good many times.) I asked him where Helms would secure the gravel, and he told me it would come from a deposit near Dayton, and that the gravel plant was already in operation. They were producing material for other Helms jobs in the Carson-Dayton area. I asked Willeford to furnish me with copies of the truckload weights of asphaltic mix in each day's production, which he promised to do.

I had intended this informational trip to be on my own time, but in talking to Jim Rankin, the county engineer, he thanked me for doing what I had done, as he had not had the time to check all the preliminary details. He also said I should be paid for my time and travel expense. Accordingly, I put down two hours time and ten miles for travel expense.

Tuesday, July seventeenth, I received early in the morning a phone call from Helms superintendent, Carl Wegren. He asked me if I could meet him at the Dayton gravel plant, nine A.M. I drove to Dayton and met Dave Peck, the gravel plant foreman, and he showed me around the area. At about ten A.M. Wegren arrived, and we discussed gravel production from the Dayton department. The gravel plant was a modified Cedar Rapids, with a capacity of about a thousand tons per day. Wegren and Peck stated that there was usually a shortage of the material smaller than 200-mesh, but they could guarantee at least

three and a half percent; and if I were satisfied with that percentage, they would have no problem in meeting the specifications—that is, the specifications I had written. I agreed.

Wegren stated they probably would not be in production for the Douglas County overlay jobs until they finished at the new shopping center called the Warehouse Market area north of Highway 50 and east of Carson City. This probably would be near the end of the month. I spent about two hours on this trip and traveled twenty-nine miles.

Tuesday afternoon, Jim Rankin phoned and said he would like to have a meeting Wednesday morning at his Minden office with Carl Wegren and me. Accordingly, we met in Jim's office at the appointed time, and the three of us went in Jim's car to visit the proposed overlay jobs. We visited the Johnson Lane project first, which is just beyond the Carson River a ways, and takes care of traffic in the easterly side of the valley. Then we went southeast of Gardnerville and looked over the pavement areas, leaving southerly from Highway 395. This county road crosses the Carson River and serves the Basque restaurant and golf course and a number of residences in the river bottom (that is, calling "river bottom," river bottomland really). The road then ascends to the mesa and where it becomes the Dresslerville road—probably because Dresslerville was the name of the Indian colony nearby. Numerous homes had been constructed during the past several years westerly from the Indian colony, and more were to be built.

Jim had the county forces patch chuckholes and most of the bad places, and these roads were ready to receive the overlay paving, which was to be full twenty-four-foot width. The thickness of overlay would vary from about one and a half inches on the edges to one inch on the roadway center—that is,

talking about these down in the lower end of the valley. The upper end of the valley—the Johnson Lane—we simply would use the half-inch overlay.

Intersections were to be repaired or overlaid and properly feathered at edges to provide smooth-riding transitions on turns. This applied principally to main paved intersecting roads and driveways. Ranch road approaches were to be feathered to some extent. Such roads were for the most part unpaved. Meadow gateway approaches were not to be provided with approach feathering. Feathering of all principal approach roads was to be at least three feet in extent on beyond the main paving.

There was some question as to the extent of the number of places to be paved or overlaid on the Dresslerville mesa, as this was a rapidly developing area. But Rankin said this would be definitely settled before the paving commenced. I suggested that at least one stabilometer test be made on the proposed asphaltic paving mix, and it was agreed this would be done on a sample to be taken at the mixing plant on one of the initial batches. I was credited with three hours time and twenty-eight miles travel this date.

The following day, Thursday, July seventeenth, I received a telephone call from Carl Wegren, who stated that a couple of truckloads of my specified mix would be sent to the Warehouse Market job east of Carson, and that if I were to be out there by one-thirty P.M., I could pick up a sample for the stabilometer test. This I did, but Carl Wegren would deliver the sample to the Sharp and Krater testing laboratory in Reno—at least that is what I thought. But Carl must have forgotten about it; I called the laboratory, and a tester agreed to come to my place Saturday and would get the test underway Monday, July twenty-third.

Thursday, July twenty-sixth, I called Sharp and Krater and was told results were not quite complete, but tests would be finished this date and report mailed out tomorrow. The test report showed a stabilometer value of forty-eight, which is very good. Asphalt content by extraction was 6.9 percent, which was a little higher than the specified content, but still okay as long as you had a good stabilometer value. Sieve analysis of the extracted aggregate was also reported and was within tolerable limits of the specification. The results had also been phoned from the lab to Carl Wegren, and I called him and told him everything was satisfactory. This preliminary test work was necessary because most counties have no materials lab and seldom have trained personnel to write specifications and check all the contractor's equipment and operations.

Decision to start the overlay jobs came suddenly. I received a phone call at seven A.M. the next day, July twentyseventh, stating that Helms would start the Douglas County paving this date because the Carson airport work was abruptly discontinued, at least temporarily, on account of fire-fighting flights interfering. At that time there were brush fires on the countryside somewhere, and they were using the planes for fire-fighting.

The hot plant trucks and other equipment were all ready to go. I left Carson immediately and drove to the Empire hot plant where I met with Carl Wegren, superintendent, who outlined his plans for the day.

Paving started on Johnson Lane, which serves ranches and the new subdivisions on the easterly side of the valley and intersects U.S. highway, as I stated before, a relatively short distance south of Carson River bridge on U.S. 395. The first load of mix arrived about eight-forty-five A.M. Traffic on Highway 50, also on Johnson Lane, at this time of day was heavy, but flagmen aided in avoiding traffic mishaps.

Before actually placing paving material, a tack coat of liquid asphalt, grade 55-1, diluted 50-50 with water, was spread twelve feet wide on one side of the old pavement and out about three extra feet on the intersections and residence driveways. Seldom-used ranch roads, of course, especially the Ones entering field and pastures, were not to be primed nor paved. Only half of the traveled way was primed and paved, because room had to be left for traffic to and from U.S. 395. The Helms distributor operator did an excellent job of spreading the prime coat. Paving followed immediately behind the primed application. The paving moved right along and ended at five O' clock, approximately five hundred feet from the end of a two-mile stretch on a southerly lane.

George Dangberg, in charge of county maintenance and repair, arrived early in the day and decided to check the first mile of paving for tonnage. Twenty-five truckloads were placed and compacted and, according to the weight tickets, gave a total tonnage of 490.4 tons. uniformity of the amount of new paving per square foot, of course, could not possibly be just right because of irregularities in the underlying paving. As might be expected, there were some high and some low spots in old paving, and some of the quarter points were especially high or low, and edge areas were low. Helms paving crew work was well coordinated, and the rakers did an especially good job of feathering edges and approaches. Carl Wegren, superintendent, visited the job several times.

Approach area at the U.S. 395 intersection was not overlaid until about two P.M., and the finished job looked good. Foreman Mel Vasquez was not available this date but would be available Monday, the next paving day.

Pay quantities for the day: subject to checks of truckload count and accuracy,

arithmetic was 886.85 tons of asphaltic mix. The approximate percentage of the asphalt in the mix was six and a half percent. Paving asphalt was furnished, as stated before, by the Douglas Oil Company and was of 85-100 penetration grade. (I might make a remark here about that: hard asphalts or paving asphalts are designated by their consistency; and they're not liquid at ordinary temperatures, but they're a certain standard temperature. There's what we call a "penetrometer," and it has a standard needle on. And suppose you measure the consistency of the asphalt, how deep that needle will penetrate in five seconds—and this 85-100 penetration grade is usually the standard so-called hard asphalt used in paving mixtures.) The Douglas company had also been furnishing the SS-1 primer.

Temperature of the paving mix as measured at the asphalt plant was about 3800 Fahrenheit, according to Carl Wegren. A thermometer was not yet available for field checks, but would be furnished next paving day. However, appearance of the mix and ease of application indicated satisfactory operation.

The total tonnage that was just given was sufficient to finish about one-half mile of the north half of the Johnson Lane overlay. The entire crew showed experience and excellent performance, and the contractor's handling, laying, and compacting equipment all were in good condition. It's a pleasure to work under these conditions.

Weather for the day was fairly hot, ambient temperatures being in the high nineties. Sky was clear most of the time, a few flocks of cumulus clouds appearing late in the day.

Personnel this date included the following: Carl Wegren, superintendent, but acting as paving foreman in absence of Mel Vasquez; Al Wichert, paver operator; one screed operator;

two rakers; one laborer; two roller operators; a broom and water truck operator; and eight truck drivers. At the Empire batching plant Claude Willeford was the plant foreman, and the weighmaster, of course, John Battcher. Other personnel included one mixer man; one laborer; and the roustabout, who takes care of miscellaneous chores around the plant; and eight truck drivers to haul the mix. The Dayton gravel plant personnel consisted of Foreman Dave Peck, one loader operator, one truck driver, and one laborer.

Equipment consisted of the following on the street (that is, the area to be paved—the engineers always refer to that as the "street," regardless of whether it's in town or out in the country): one Cedar Rapids paver, one Hyster roller for initial breakdown, one Galion roller for finish rolling, one power broom for cleaning the old pavement, one grease truck, one oil distributor for prime coat, one water truck to supply water for the rollers, and one specially equipped pickup for machinery repair work. This more or less detailed description of the first day's operation is quite typical of operations of this kind.

Except for arrangement in narrative form, the description is actually a near replica of my daily reports to the county engineer. The reason for going into so much detail on this one day's operation is twofold: first, the researcher at a future time when delving into modes and methods of highway construction and maintenance in the mid-twentieth century will need such detailed depiction better to portray his comparisons with his current operations at his time. Second, he will become familiar with this particular type of engineering inspection with all its details and can, if he so desires, make comparisons on the subject in his own era.

On Monday, July thirtieth, the same type of operation continued. The hot weather was

cooled somewhat in the afternoon by a light shower around three-thirty. The moisture received, however, was not enough to stop paving operations. Asphalt content of the mix, aggregate gradation, and mixture temperatures were not changed, except that a special mix was necessary at the U.S. 395 intersection with Johnson Lane. Considerable feathering at this area would be necessary to produce a smooth transition section. The maximum-size aggregate was reduced to three-eighths inch for this area; thus, there was but little waste from the feathering work by the rakers.

This day's work commenced on the southerly half of Johnson Lane at the intersection with 395, the first truckload containing the smaller maximum-size aggregate, three-eighths inch. The rest of the aggregate was the regular half inch. There was only one slight delay about ten o'clock, due to minor repairs on the paver. Otherwise, progress and workmanship was excellent.

Width checks were made on the twelve-foot pad late yesterday, and after paving the adjacent half on the south side, they were made on the total width. Variations from the required twenty-four feet were minor.

Breakdown rolling and finish rolling was satisfactory. Perhaps a little should be said about breakdown rolling. The temperature of the mix right directly behind the paver is still quite high, and usually the roller is not allowed on that until it gets down, Ms dropped down to a temperature, say, around a hundred and fifty or thereabouts. Then he gets on it and makes a single roll or pass, and then he gets off and waits—and goes on further, or if there's only one roller man, then he'll go back where the previous rolling was done and do his finish' rolling. The finish rolling might be done with a different type of roller; it could be a rubbertired roller, or it could be a regular steel roller. So the breakdown roll

is quite important because that always allows you a pretty good chance to check up on the thickness of the material because that heavy roller gets it down there pretty well right at first. The final rolling is more to even up things and take care of low and high places, and sometimes a man has to be there with a little mix, with a shovel, and spread it where needed. I thought the word "breakdown" should be explained a little more thoroughly.

The SS prime was placed on the southerly half of the roadway early in the morning. All local traffic was thus handled on the north half of the pavement, which was paved yesterday. Operations for the day were finished at five ten P.M. A total of 1,022.6 tons of asphaltic pavement was used.

Tuesday, July thirty-first, Johnson Lane was finished in the morning, and the operations were moved to Dresslerville Lane. Weather was still hot and partly cloudy. A light shower fell at two-fifty P.M. but did not interfere with paving operations. The personnel was the same as July thirtieth, except that a roller man was transferred to a job in Fallon, and Mel Vasquez, foreman, made his first appearance on these Douglas projects. Equipment again was the same except for transfer of one truck from J. L. Savage of Carson City to replace one being repaired.

The prime coat on the remaining part of Johnson Lane was placed early in the morning. The distributor was then sent to Dresslerville Lane to prime one-half of a portion of that road. Placement of 154.15 tons of paving finished Johnson Lane overlay. Some time was lost in transferring equipment and personnel over to Dresslerville. I stayed on Johnson Lane until the rolling was finished, and I made final width measurements. Paving on Johnson Lane was finished by nine-thirty-five A.M., but another one and a half hours were required to finish the rolling.

After thorough brooming of the old pavement, the distributor placed prime coat SS-1 on the southerly half of the Dresslerville Lane for about three quarters of a mile. George Dangberg had been on the job, and had set a binder twine line on the first tangent to guide the paver operator, as the southerly edge had been so badly rutted that it would have been difficult to determine the proper twelve-foot alignment [laughing].

After finishing at Johnson Lane, I had plenty of time to go over the Dresslerville job with George Dangberg, as the paver had trouble getting set for the start of work. George and I found other places where guidelines should be established, but he had run out of twine [laughs]. We decided I would have to assist the paving operator and do the best we could in establishing the initial one-half section.

We had also marked out a stretch for checking application rate, knowing there would be an overrun in tonnage per hundred feet due to the necessity to fill the ruts. Sure enough, when paving that particular stretch was finished, the overrun was about fifteen percent.

Once it started, paving progressed well, and the southerly twelve feet of the road was overlaid for a distance of sixty-five-hundredths of a mile. All the operations were well done—laying, raking, and feathering (when necessary), and breakdown and final rolling—in spite of the bad condition of the pavement underneath.

The overrun in paving nicks was necessary, however, because of numerous chuckholes, as the old pavement had been used pretty hard, and there were voids at the paving edges. 763.50 tons of mix were placed this date on this sixty-fivehundredths of a mile, twelve feet in width.

Wednesday, August first, personnel and equipment were the same as yesterday. Mix

proportions and gradations, the same also. Hot weather continued, and in the late afternoon the sky was partly overcast with cumulus clouds, and a light shower fell between four and five o'clock but was not of sufficient length to shut down work.

The tack coat for paving was laid yesterday and caused problems with impatient travelers, who were loud in their protests. Today's tack or prime was laid in much the same manner on one-half the roadway, but travelers used more caution, tempered with some degree of common sense, with respect to speed of their vehicles.

Paving started on the northerly half of the roadway. Operations were generally good, but a motor on the paver went out of commission for better than three hours. I used the time to drive to the office to report conditions and ask some questions.

I laid out markers on the roadway where fourteen loads were placed on the northerly lane. Dangberg and I then made a measurement of the distance with the measuring wheel. The 307.15 tons and the fourteen loads had covered the twelve-foot width for 2,858 feet. Thus by computation, we found the overrun to be 13.7 percent, which really was not bad, considering conditions of the underlaying pavement.

Two trenches over recently laid pipelines crossed the highway and had been filled with cold mix. The mix was in poor condition. The contractor volunteered to dig the cold mix out and replace it with hot mix. When asked about preparing a change order to pay for the extra asphalt, Mel Vasquez said, "Forget the change order. They make too much paperwork" [laughs]. I thought that was a pretty good deal, so I thanked him. That could be done, of course, on very small extra work like that, but usually where the extra work amounts to quite an expense, a change order or extra work order is made out.

Paving ended about a hundred feet from yesterday's ending to avoid joints near each other. Total tons laid this date amounted to only 581.45 due to three-hour breakdown of the paver.

On Thursday, August second, we had very warm weather until about one-forty-five P.M. when showers started and became heavy at two o'clock and included hail stones. The shower was over at two-twenty and it was much cooler. The water caused a problem, which delayed operations for a time. There was no work from two 'till three P.M. Water had to be diverted from the middle of the road to the right side, as the first pad laid yesterday acted as a dam going around curved areas.

Paving then continued until the last load was placed; this load had left the hot plant at four o'clock. Final rolling was finished by five P.M. We estimated that three or four more loads would finish the Dresslerville overlay job.

Personnel and equipment were about the same as yesterday except that one of Helms' trucks was replaced by a semi owned by John Savage. Total tonnage laid this date was 971.40.

On Friday, August third, it was raining in Carson City at seven o'clock and when I left for work, and it continued intermittently until eight-fifteen. The personnel and equipment were about the same as Thursday. There was only a short strip of Dresslerville Lane to finish. It had been primed with 55-1 the day before. It was necessary to wait 'till the sun dried most of the dampness before finishing. Only 59.40 tons of asphalt mix was required to complete the Dresslerville job. The paver was through by ten o'clock in the morning, but finish rolling could not be done 'till rakers had finished feathering at the end of the job.

Some extra truckloads of asphalt mix were sent to other areas under construction

by the contractor. The asphalt mixing plant was notified by the foreman to send no more mix this date.

After Dresslerville road was finished, Mel Vasquez and I went over the next project, which was Riverside Drive. There were numerous chuckholes and minor depressions still containing water from the rain. We decided that no SS-1 prime coat should be laid until all wet spots were dried. These spots actually did dry out very well over the weekend, and priming could begin early Monday. (This section referred to is the section right immediately of f 395, leading past the restaurant and golf course up to the top of the hill. There are other roads leading from that up and down the valley, but at that time they were unpaved and were not to be repaved that year.)

Monday, August sixth, overlay on Riverside Drive was begun. Working time this date was the regular seven-thirty in the morning 'till five P.M. with one-half hour for lunch. Weather was warm and mostly sunny; there were clouds in the afternoon along the mountains. Personnel and equipment were the usual of the past few working days. This last day of the overlay job was done without stop for breakdowns or weather conditions and was handled expertly under the supervision of Mel Vasquez. Mel also rode the paver on extra rough or chuckholed area, taking care of the lefthand side of the screed. (To the uninformed, the screed is the mechanical, toothed reciprocator [laughs], or mechanical rake. It is in constant back-and-forth motion as the paver is ridden, and normal to the direction of motion of the paving machine. The screed can be adjusted by the screed operator higher or lower than the regular setting for depth, depending upon what he encounters. For example, he can use his own judgment on striking a low place to

see that it is filled. The proper adjustment of the screed, however, is best done by an experienced screed operator; otherwise, depth variations, which an inexperienced operator may cause, ends up with bumpy or rough pavement.)

The average depth of the overlaid paving was supposed to be one-half inch, but chuckholes and extreme unevenness of the old paving caused an overrun in the new tonnage for in excess of the estimate.

Riverside Drive lies between U.S. 395 and the mesa, as I have already explained. Because of the presence of this golf course and the Basque restaurant alongside, also because it serves as an outlet for a fast-growing local population, the traffic is quite heavy. In placing the SS-1 tack coat, as well as paving operations, caused considerable inconvenience to traveling public, but complaints were minor.

After rolling was completed, low areas were found in the finished intersection on the mesa. I requested repairs. This was done by hand-shoveling and hand-raking some additional mix front a truckload, including final finish rolling.

The day's work ended at near five o'clock, and according to truck weights, 863.70 tons of hot mix was used. This finished the Helms overlay jobs except for a few small areas which had been marked by me for patching. Patching, however, was not done 'till later.

The following day, Tuesday, August seventh, I spent some time at the Helms batching plant at New Empire. I was checking my pay quantities with the records kept by the weighmaster, John Battcher. I knew I had missed some weight tickets, and, as expected, John had more nearly accurate and complete figures than I could produce. I secured all these figures and delivered them to Jim Rankin.

overlay jobs originally planned for the 1973 season were thus completed. However, late in September a sixtythree-hundredths mile of new pavement, two inches thick, was extended eastward from Johnson Lane. This probably resulted from requests by residents of the newly built homes in the east valley foothills. This operation will be described later.

RANCHO ESTATES

Jim Rankin said that I might be needed soon to inspect paving of a new subdivision called Rancho Estates. This subdivision is located a considerable distance west of Dresslerville but probably will eventually join the subdivision immediately west of that location. The contractor and project developer was known as the Environmental Communities, Incorporated. The project manager was Robert T. Crowe.

Work on this paving was begun August twentieth, but Jim Rankin did not notify me 'till eight o'clock the following day. I drove to Rankin's Minden office, and he went with me to the job site, where he introduced me to Robert Crowe and explained briefly what was to be done.

The project contained six streets two or more blocks long (but the length of each street varied considerably), one short stub street and five courts. All of these were to be paved with two inches of asphaltic mix. well-compacted and fairly well-graded DG base was already prepared and ready to be paved—however, without any prime coat. This probably was all paid by the owners of the subdivision because people hadn't been moved yet, and there were just a few houses built there, and the county's responsibility was simply to see that the things were built right. But they did not have detailed specifications, and the roads

were not built to standards which would be built for a main county road—just developer's standards, more or less.

The stub street was named Pioche Way, and the other six streets were named Kingston Way, Arlington, Bolivia Way, Franklin, Monarch, and Manhattan. The courts were labeled Belmont, Como, Wonder, Rawhide, and Columbine. You would think from all these you were getting into a high-class, hot-shot subdivision! Actually it was not the case.

Paving was by no means carried on every working day; it was interrupted by numerous breakdowns, and at one time by delay from September seventh to September twelfth by lack of money to pay for the Bing Construction Company's paving mix. There was another delay from Monday, August twenty-fourth, through the thirty-first due to the Bing company being involved in a California job on Luther Pass. Actual paving took place on ten different working days. This small job could have been finished in five or six days if construction had been handled and supervised by professional paving contractors, such as Helms or the Bing company. Bing's part of the job was to furnish the asphalt paving mix only.

The work done August twentieth, when I was not present, consisted of paving all the stub street, Pioche Way, and a portion of one part of a pad on Kingston Way.

I took inventory of equipment and personnel on the twenty-first. Equipment consisted of a secondhand BarberGreen paver, one three thousand-gallon water truck, one tonton Galion roller, one Vibropac roller (which is a smaller one), and one Ford skiploader. Bing company, furnishing the asphalt mix, was using four trucks—three bobtails and one ten-wheeler. The contractor and project developer was the Environmental Company and was handling the paving with

Robert Crowe, the project manager, who tried to act as the paving superintendent. Russ Merdinger was the foreman of the paving crew; he also acted as a mechanic and took various tasks from time to time relating to the paving. He had mostly green men and had to show them how to do their jobs, but was hindered sometimes with interference by Bob Crowe. Other workmen included a paving machine operator, a water truck driver, a roller man, a screed man, and two laborers who worked as rakers and hand-shovelers.

Asphalt used by the Bing company was furnished by the Sheldon Oil Company, and the temperature of the mix as it would leave the plant was slightly above 3000 Fahrenheit. I secured test reports covering gradation of the aggregate and found it about the same as the gradation by the Bing company on the Kingsbury grade. It was three quarters-inch maximum size and met standard specifications of the state Highway Department, a specification which I had written a number of years ago.

I asked about the prime coat before paving, and found that none had been specified. This apparently was okayed by the county engineer for subdivision streets.

I was very much disappointed with the job setup. The paving machine was a clunker and was often out of working order. The crewmen were green except Merdinger, the foreman, the paver operator. Bob Crowe was anything but a competent superintendent on the paving job. My first checkup was to determine if the finished paving pads were going to be two inches thick. After observing rolling for a short time, the finished pads appeared to be thinner than two inches. Crowe was on the screed man's platform watching the right-hand side. I asked him if I could examine his depth measuring device, and I found it to be only one and three quarter inches long. I

immediately stopped operations until a new, two and three quarter-inch device could be prepared. Compacted thickness of the pad using the one and three quarter-inch device on the uncompacted asphalt would give no more than about one and one-eighth inch thick of compacted asphalt. Upon using the two and three quarter-inch measure, the resulting compacted pad was more nearly two inches in thickness, as it should be. I wondered at the time why a superintendent could be so stupid, but later, when the twenty-five thousand dollars worth of paving ran out before the job was done, I understood his apparent attempt to make sure the money was sufficient, regardless of specified depth.

Crowe also made more problems than solutions by insisting on operating the screed. Russ Merdinger did not try to interfere with his superintendent, of course. Crowe probably was trying to keep thickness at a bare minimum. I threatened to shut the job down 'till the screed was properly handled by someone with the know-how. Crowe stayed off the screed for a few days but was on again several times on a later date. But I watched him closely. Actually the screed man he hired learned to handle it very well with Foreman Merdinger as his instructor. Crowe's continual jiggings up and down will result in uneven rolled surface containing a series of "bird baths."

I found the base well compacted and well formed with proper crown; it had been well watered. There were, of course, the usual small variations which affect smoothness of the paving, but these base variations produce no worse results than do rapid changes in a screed control, which really are not necessary.

The roller operator handled his job quite well. He had to wait to make breakdown roll a number of times on account of paver breakdowns.

At the end of about three days' paving, the crew was doing altogether a fairly good job but were following Russ Merdinger's instructions. I tried to keep Crowe from interfering as much as possible and suggested that he leave the paving responsibility up to his foreman, Merdinger [chuckling].

I went with Crowe to look at two places on Manhattan where cross drains were to be installed. This had to be done to secure proper drainage and should have forming done and concrete poured as soon as possible. The concrete would have to be cured before paving in these two areas adjacent to the concrete.

By the end of the third paving day, Belmont Court, most of Kingston Way, and all of Bolivia Way were finished; and Franklin was partly completed, as was Monarch Street.

On August twenty-third, I accompanied Bob Crowe to the Bing Construction office to discuss Bing's plans relating to continuing work on Rancho Estate paving. Bing stated that he could do no more paving on the twenty-fourth due to California's calibration crew utilizing most of the day going over his plant. He also stated that he probably would be a full week on the paving project on Luther Pass in California. This was to be an overlay job.

When Bob Crowe and I returned to the Rancho Estates job, the paver was again down with mechanical trouble. Attempts to continue paving with the machine were of no avail, as it was completely down and out. By twelve-forty P.M. there was no more paving. Both the feed chain and an axle had broken.

I wondered at the time if this machine, which was a derelict to begin with, could ever receive sufficient repair to finish the job. Since approximately seventy tons of paving material was still in the trucks and in the Bing plant bin, I allowed the crew to borrow Bing's pull-box. We would then try

to utilize the material on a stub of f Monarch. This eventually worked out pretty well. The surface of the freshly laid paving looked better to me than the machine finish behind the Barber-Green, especially if Crowe had been on the machine running the screed! The road material also looked satisfactory, but the thickness was a little better than two inches on the finished pad. But we managed to utilize all the material, thus avoiding wasting it at the user's expense. As I recall, Bob Crowe came up with a compliment [laughs].

By this time the green workmen on the crew had caught on sufficiently to do a much more acceptable job in spite of the failures of the paving machine. Further paving was delayed until after Labor Day, when the Bing job at Luther Pass was finished.

September sixth, operations started again. The BarberGreen had been fairly well repaired during the interim between August twenty-third and September sixth. Bob Beytler, the screed operator and the paver operator, had made the repairs. Russ Merdinger had been cat off as foreman and was now the roller operator. Bob Beytler was the acting foreman.

The work started with equipment about the same as in August, but with some switching of jobs by workmen; and a laborer, who was an Indian, was put on as raker. He had been doing that kind of work for twenty-five years.

The Bing plant changed asphalt brands on September sixth and was now using Chevron, manufactured by the Standard Oil Company. Due to cooler weather, a slightly softer asphalt of about 100-110 penetration was used. Percentage in the mix was about 6.2, and the temperature of the mix was kept sufficiently hot to lay down very well.

Things were going well 'till Bob Crowe again got on the screed platform and began

to perform his old tricks. I had to ask him to leave screed operations to his acting foreman, Bob Beytler. He left at noon for business in Las Vegas.

Work progressed very well in the afternoon under the guidance of Bob Beytler. The four Bing trucks were kept on the move, and there was no slowdown because of a jiggled screed or machine breakdown. The rakers did a good job, but were not overworked. Progress was so good, however, that the roller was crowded to keep up with the breakdown rolling.

Mr. Bing drove up to the job and told me that Crowe would get no more asphalt mix until he could arrange payment for it, as he had now used up the twenty-five thousand dollars worth, which had been paid for, and which had been presumed to be sufficient for the job.

The Bing plant was shut down at a little after three P.M., and the last truckload was placed by three-forty-five. Between that time and four-thirty, I walked all areas paved this date, inspecting the rolling, and found it satisfactory. I arrived at the Minden office of Jim Rankin at five P.M. and reported the situation to him.

The fact that Bob Crowe had gone to Las Vegas apparently had something to do with his financial trouble.

Delay due to the money situation lasted but a few days. On Saturday, September eighth, I visited Jim Rankin at his home, and we discussed the situation. We agreed that I should drive to the job site Monday and check over the situation. This I did and was told by Bob Crowe that he could not secure the asphalt mix from Bing this date, so there would be no paving. He would, however, work a small crew watering the grade—those unpaved areas—and would pour concrete drains. He said to call him that evening about continuing the paving.

I stayed on the job about one and a half hours and reexamined the rolling of the last couple of working days. I found several bad spots which I had noticed before, and I marked those areas with white spray paint for future repair. I reported this to Crowe, and he promised to secure "fine" graded mix, when it was available, and would give attention to the marked areas and also to bad spots at intersections.

I stopped at the office and informed Jim Rankin before returning home. At seven o'clock I phoned to Crowe; he told me there would be no pavin' 'till Wednesday, the twelfth. I called again Tuesday evening, and he said they would start paving Wednesday at seven A.M. I checked with Jim Rankin by phone. He said that it was doubtful that they would start, but I should go out there anyway and check.

I arrived on the job at seven the following morning, and found the crewmen a-id the paver all set to go, but the first load did not arrive 'till seven-thirty. The grade looked dry, and I asked for water, and also had laborers clear loose sand from against the curbing where it had accumulated due to watering. I called attention to a leak in the base of a fireplug on Manhattan opposite the Franklin intersection. I also called attention to necessity to raise the grade around several manhole openings after paving was finished.

Paving began, when the first load arrived at seven-thirty, at the end of the last paving a week ago. This was on the left side pad on Manhattan. Work progressed well with the Barber-Green actually performing as it should, and all workmen were performing well.

At one-thirty-five operations were moved to the westerly portion of Manhattan, where the entire area between cross drains was finished by four-fifteen. Care was necessary to

prevent damage to the young concrete drains, which were poured just a few days ago; thus the machine was not used in their vicinity. Paving was placed by hand adjacent to the drains and hand-raked. The finished paving after rolling looked good.

I worked part of the time this date observing the rolling and walked the entire job, thus far finished for more or less a partial final checkup. All was good except near the fireplug previously mentioned, and in a few places where soft spots were found. These probably will have to be treated after the final punch list is made. (A "punch list" is a term referred to checking of a job after all construction, theoretically, at least, is done to just make doubly sure everything's right.)

All paving on this project, except for small trouble areas was finished, and except for 350 feet on Manhattan and two cul-de-sacs. This could be finished possibly by one more day's work; and that, I assumed, would also finish my part of the inspection.

On September thirteenth, the crew and equipment were the same as on the twelfth with Bob Beytler acting as foreman. The 350 feet on Manhattan was laid by nine-twenty-five in the morning, with breakdown rolling finished in about a half hour. There was some difficulty in getting a good-looking finish at the intersection of Manhattan and Monarch, due to attempting to fit pads with one percent slope with the paving with flat pads. Therefore, the intersection appeared to contain a slightly low area; nevertheless, I was sure that drainage would be okay.

Paving of Rawhide Court, which intersects Manhattan, was finished by noon. Bob Crowe again assumed that he should be helping with the screed, so he tried to operate one end, while Beytler operated the other. Bad results of this so-called help-so I immediately tried to stop it and succeeded finally in getting

Crowe of f the paver! [Laughs] The evidence of his so-called help showed up immediately after the breakdown rolling was finished. It was therefore necessary to add more material along the arc of the curve, rake it to provide proper drainage and appearance, and reroll.

Columbus Court was paved next, and the crew finished with the Barber-Green paver by two o'clock. The court looked good. The paving crew was put on other duties. One member had to replace the roller operator, as he had become ill at about two-thirty P.M. It was doubtful if the finished rolling could be completed before dark. I would return tomorrow and recheck rolling and mark bad spots for repair where needed.

Bob Crowe stated that the patching needed on the bad spots, and especially those on the curved cul-de-sacs and near the concrete work, would be done after the manholes had been raised to the surface. Some of the intersections of these paved streets with the main road on the north were too high. And these probably would have to be dug out to some extent, lowering the base also, and adding fresh asphalt by hand and rolling. This work would be done later and would be inspected by regular county employees.

JOHNSON LANE EXTENSION

I had one more small project to inspect in Carson Valley. This was on September twenty-eighth. Apparently the residents at the easterly end of Johnson Lane wanted an extension of paving of about sixty-three-hundredths of a mile. The county, therefore, secured Bing Construction to do the job, and as I recall, it was to be done on a costplus basis—that is, the cost of materials and work plus a certain percentage, which is usually fifteen percent.

The paving was to begin where the earlier work in midsummer had ended. A base of

gravel mixed with native local soil had been watered, compacted, and was in readiness to receive the two inches of compacted asphalt surfacing. There would be no prime of the base in this case.

Bing's crew consisted of Butch Carlson as foreman and paving operator, with Al Ashby operating the screed. These were two of the crewmen on the Kingsbury gas line job early in the summer. Other crewmen operated water truck, rollers, and attended to raking. The trucks hauling asphalt were a part of the plant crew. Plenty of equipment of the right kind and experienced employees were on hand, and this small job proceeded in good order.

The first truckload of hot mix arrived at eight-fifteen, and spreading and breakdown rolling was finished on the first one-half of the roadway by eleven o'clock. Checking truck weights against theoretical weights of the volume laid indicated there was a shortage. The measuring device for depth of freshly laid, unrolled mix appeared to be satisfactory. I checked again and found it was okay.

When the second half of the paving was laid—that is, the other half of the street was paved—a slightly thicker mat was placed, but a final check showed this half also was short of the theoretical weight. Total tonnage of the thirty-six truckloads gave a figure of 884.64. The mix had been properly placed, and temperature of the mix at the plant was 2800 to 3000 Fahrenheit. And at the paving site, there was very little loss in temperature. Low tonnage figures for the sixty-three-hundredths of a mile job was no doubt due to slightly high quarter points in the compacted base, which would reduce the thickness of the pavement at those points and thus result in a final lower weight than was expected. Finish rolling appeared satisfactory in all respects.

I had no more inspection jobs directly for Douglas County during the balance of 1973. At the end of September I believe I was all through with my private inspection work for this season. I spent most of October doing yard work, which consisted mainly of raking leaves and pulling up frosted flowering plants and placing them in a compost heap, wetting the heap, and then adding a specially prepared bacterial product to hasten decomposition.

I attended practices with both the Shrine band and the Reno Municipal Band in preparation for the Admission Day celebration.

RETIREMENT CAREER III: ROUND HILL TO GLENBROOK UTILITIES

Erik Beyer called me a few days before Admission Day and stated that he had been appointed to be the engineer in charge of the big sewer project from Round Hill to Glenbrook. He said he would need inspection to help and asked if I would accept an inspection job. The pay for professional grade engineering inspectors would be eight dollars per hour for an eight-hour shift with time and a half for overtime. Inspectors would furnish their own transportation, but would be compensated at a rate which was established later.

All inspection would be under Erik Beyer's supervision, of course, and Erik arranged with the district that he directly employ the inspectors and would take care of the transportation with them. In fact, Erik ran the job and all inspectors worked directly under him and were paid by him, and the whole bale of wax was furnished to the district by Erik to receive his compensation. Inspectors were asked by Erik to inform him of the percentage they wanted to be deducted from each paycheck for federal income tax.

The social security taxes, of course, would also be deducted.

Erik also stated that the contractor for sewer lines was the H. M. Byars Construction Company of Reno. Teichert and Son, Incorporated of Sacramento would be the contractor on the pumping plants. Inspection of the pumping plants, he believed he could handle himself. He would let me know when construction would begin on the pipeline.

I did not have to wait long for the notice. Erik called, I believe about October twenty-eighth or twenty-ninth, and said one crew of the Byars outfit would start work October thirtieth, and they would start just above the office in the Cave Rock area. I told Erik that I had promised to take a part in the music for Admission Day on that particular date. He said he would watch things that day if I were to report for work November first. I agreed.

Thus I played my French horn with the Kerak Shrine Band in the parade. We did not march but rode in a specially prepared truck, which the other Shriners called the "pansy wagon" [laughs]. We did not make a hit with

the marchers because we were riding. But we had something else to do; we had to play the music as well as walk, so we might as well take it easy, we thought.

In the afternoon after changing uniforms, I joined the Reno Municipal Band, and we played the usual concert in front of the old Carson post office, and that concert lasted about an hour or an hour and a half. I played first horn in the Shrine band but played third horn in the Reno Municipal Band. As a matter of fact, that date, October 30, 1973, was the last time I played in either of the two bands. The Shrine band was disbanded early in 1974, and another band has not been organized, even up to the present time, 1976. I was unable to play in the Reno band in 1974 because of long working hours on a construction project. My days as an active band member thus came to an end.

The Reno Municipal Band was a union band. I played with that band directed by N. A. Tinkham for sixteen or more years and enjoyed every minute of it. I received a life membership in the Reno Musicians Union, Local Number 368, on June 15, 1970. Since that time, I have not had to pay union dues. I have a gold-colored, life membership card.

One other thing the union does which is very interesting if you've played with them, been with them for quite a long time—upon the member's death, the surviving wife or husband, which ever case may be, receives one thousand dollars.

In referring to the Round Hill-Glenbrook sewer project, it is well to describe some of its features. Design of the project was by Clair Hill and Associates of Redding, California.

This was a complicated undertaking, both in design and construction, because many governmental branches would be involved. First, because of steadily increasing population of the area in question, there was

a steadily increasing danger of contamination of the Lake itself. Some of the other populated areas around the Lake had sewer systems built or had them built, and these systems included, or were to include treatment plants.

Health officials, environmentalists, and the Tahoe Regional Planning Agency had steadily applied coercive pressure on the area in question to construct a modern sewer system. This system would be coordinated with four other systems being already built in that particular part of the Lake—that is, that part of Nevada area.

And the general plan was to arrange all main interceptors in this Nevada-populated area on the south side and easterly side of the Lake, so that the raw sewage would flow into a single treatment plant. There were five such areas: Douglas Number One, comprising the hotel and gaming area at or near the state line; the Elk Point area; the Kingsbury area; the Round Hill area; and finally the area from Round Hill to Glenbrook. A regional treatment plant was built to handle all sewage in all these areas. There would be a two-stage treatment at least for the present time and possibly continuing in the near future.

No doubt—at least to my way of thinking—there will have to be a tertiary treatment later on because of where the effluent ends up [chuckles]. I think the fisherman and the Fish and Game people and possibly residents of lower valleys will sometime get together and insist on a tertiary treatment.

The treated effluent from this plant would be transported from the Tahoe Basin entirely. It would go in the pipeline over Kingsbury grade and would flow into the Carson River, or some of it would be used for irrigation by the ranch and agricultural people.

Various governmental agencies which would be involved, including federal, state, county, and local groups. This made quite a

batch of governmental agencies. The federal government would furnish a portion of the funds to construct a treatment plant, the main pumping station, and main interceptors. Bonds, I believe, were to be issued for the residents to take care of the rest of the expense.

The Federal Bureau of Public Roads people would have to consent, along with the Nevada State Highway Department, to placing intercepting lines in the federal highways. Other federal agencies, such as the environmental and safety groups, the U.S. Forest Service, and the U.S. Engineers, would also have their hands in the pie, to use a somewhat incongruent metaphor. The Corps of Engineers and all these other people had parts to play, so they said, in this sewage system, and I found out a lot about that after I got under the job myself.

The state Public Service Commission would also have to approve the amounts of the monthly charges for services and the amount for fees the residents had to pay for connecting their residences to the sewer mains. Once the system was completed, the state Health Department would require that all septic systems be pumped out and backfilled with suitable soil material, such as sand.

Douglas County would be involved, as the county treasurer would receive all payments of assessments. Assessments not paid in lump sum would be paid in thirty equal, semiannual installments of principal and interest over a fifteen-year period.

One other important very semigoverning, and intensely interested body would be the bi-state Tahoe Regional Planning Agency, whose chief concern would be related to environmental and health factors. Of course, the public body most interested would be the people being served and in the one particular project in which I acted as an engineer-

inspector. That would be, of course, the people from Round Hill and the businesses from that point to the Glenbrook area. Thus all the various factors were eventually boiled down from the pot of governmental potpourri to a digestible solution acceptable to all.

Plans and specifications were prepared from detailed studies, as they should be in this kind of operation, and bids were called for and awarded to low bidders of satisfactory qualifications. The H. M. Byars Construction Company of Reno was awarded the contract for that part of the Round Hill-Glenbrook project, involving construction and the interceptor sewer line and the collector system. And, of course, Teichert and Son of Sacramento and Redding was awarded the seven major pumping stations, and work was to begin on these projects late in 1973.

Total cost of the Round Hill to Glenbrook system was approximately five million dollars, and the district chose Erik Beyer, as I previously stated, as district engineer in charge.

Size of the principal sewer main as it joined the one already in place at Round Hill—that is, the pressure main— was eighteen inches in diameter. Now all main lines delivering the sewage to the Round Hill connection and treatment plant varied from as small as six inches at Glenbrook, thence increased in size as more sewage was picked up, going southerly, to eight inches, ten inches, twelve inches, fifteen inches, and finally eighteen inches. This was a pressure line, and the pressure was induced, of course, by pumping sewage from the lakeshore to seven pumping stations down there. This main pressure line was to be constructed within and along the federal highway U.S. 50.

The highways in these areas where snowfall is heavy must expect to receive trenches for utilities, because under present

construction practice, many utilities besides sewer and water are put below ground. I have stated before that power and telephone lines, as well as gas, water, and sewer, were put in in the Incline district.

Borings were drilled under the pavement to accommodate connecting lines from and to the seven pumping stations below the road. As a matter of fact, these pumping stations with a few exceptions would receive all the sewage, whether it was from above the road or below the road, and pump it up into the pressure lines. And the pumping was continuous. That is, the pump from Glenbrook area would have a certain—the pressure was about the same, but the volume kept increasing, and it was a continuous thing all the way to the sewage plant.

The smaller mains in all these subdivisions were located in the streets also. There were problems there, as I will mention later on, on account of local water lines being placed in the roads. Where it was necessary or most convenient, however, the mains were sometimes placed in easements across private and government property. And this was done where one subdivision joined another and had to cross [a] private line to get with the mains. However, sometimes crossing those easements, there were subdivisions—no houses yet—so sewer services had to be arranged for.

In addition to the seven pumping stations, which were arranged to handle the loads progressively, there were ten smaller so-called package lifters, which operated in the various isolated low areas to lift the sewage up to one or the other larger lines.

Once the entire system was completed and working, maintenance would be contracted. An alarm system would be installed to pinpoint trouble in any area. This system would be tied in the district firehouse,

and that would make a twenty-four-hour service available. Notification, then, of the trouble could be immediately reported to the contractors who did the maintenance work.

The Byars Construction people were the first on the job. Teichert contractor us] on the pump houses would not start work until sometime in 1974. First work by the Byars people would be by a crew in charge of Joe Krmpotic, foreman, with an assistant foreman, Carlos Archuleta. I would be inspector assigned to this particular crew.

All crews on the Byars contract would be under direction of Superintendent Leo Tuccori, whose local office would be in the same building that Erik would occupy (or in part of it) at Cave Rock—or near Cave Rock. Eventually there would be as many as five construction crews on the Byars job. Besides Joe Krmpotic, the foremen would be Cal Jones, Don Collins, Ken Baxter, and a fellow of Mexican descent by name of Martinez—I don't remember his first name.

There was still another man who was put on part-time by the name of "Awol," and why he got that name I don't know, but I never did find out his real name [laughing].

Superintendent Tuccori would assist and supervise his foremen in planning and laying out the work and in selecting equipment and supplies. He would also maintain close contact with Erik Beyer, the district engineer.

A very significant feature—or features, rather—of a construction project of this kind relate to safety of the traveling public; protection of private property; protection of utility services, such as gas and power and water lines; and attention to requirements of the U.S. Forest Service, county, state, and local ecological standards [laughs]. The district engineer (Erik Beyer in this case) and his staff of inspectors must see to it that the contractor meets all requirements in the

plans and specifications and observes safety standards and property protection, as already mentioned. Where advisable, changes in plan quantities or special features are made, and the chief engineer will consult with his foreman and the contractor's superintendent and make up what are called "change orders" or "extra-work orders" to cover the extra expenses.

Duties of the inspector are really too numerous to mention all of them in detail, but the principal features in a job of this kind are as follows (I will number them):

1. To determine in advance of the proposed pipe work for the next day the locations in the main line where wyes have to be inserted to serve each of the various buildings. If the lots are vacant, a wye is usually placed opposite a low place or a place considered suitable by the inspector. In occupied buildings, the owner should be contacted to determine where he wants the service line. When the owner is absent, the inspector must make the best service location he can by observing roof vents or by peering into windows. (I had to do a lot of this, and sometimes Erik Beyer would come and help me because it takes quite a lot of time. You can't spend too much time away from your actual inspection work to go and do that. But it has to be done in advance, so the contractor can lay out his sections of pipe over the length of the job he intends to work the following day, and [he] must prepare for the number of wyes—wye connections—and also the total length of small pipe which lead from the wye in the main up to the property line. The contractor is not required to go into the property line; that expense is all on the owner himself, and of course, that will come when he's ready to build it after the sewer line is very near completion.)
2. To check carefully the excavated trench grade so that the pipe as laid will allow a continuous flow of all gravity

lines. (That, of course, is not necessarily on pressure lines. But in the gravity lines, it's much—they're arranged so that they deliver material to another collecting agency which is larger, or clear on down to a pumping line, and all of that flow must be downgraded—can't be upgrade unless a small lifter of some kind—pumping, lifting plant—is installed.)- 3. To see that all pipe sections are sound and when placed in the line, that all joints are properly put together and depressions left under the bell of each pipe end in order to maintain grade. In other words, the entire pipe must be in contact with the soil. (If you do not do that, the bell will tend to hold up part of the pipe above the grade and make a high place.)
- 4. To see that trenching and bedding are proper and that the pipe is backfilled without stones or coarse gravel particles in the first foot of backfill material. (Direct contact of stones with the pipe, especially if it is made of transite or plastic, could cause damage during compaction of the cover.)
- 5. To see that backfill is properly moistened and compacted so that the density of the backfill is sufficient to meet specifications, which usually are established at ninety percent of optimum. (This involves experience and good judgment as to frequency of testing, and the testing is usually done by commercial testers. What I'm trying to say is the green inspector just by watching things would not know for sure from lack of experience, whether compaction is correct or not. But an experienced man [who] had a lot of experience with compaction can tell pretty well if it's right, but to justify his judgment, he will have an occasional test made.)
- 6. To make sure that all damaged water lines or other service equipment receive proper repairs before backfilling the trench.
- 7. See that proper concrete thrust blocks are poured on the outside of curved pipes. (If that is not done, when liquid passes through the

pipes, there's a jumping, vibrating sensation. Some small water pipes in residences have that problem and often is not taken care of. A thrust block will hold that pipe steadily so that it will not get that vibration.) 8. To see that manhole structures are properly placed and all joints between the sections and cone section have been provided with an asphaltic leakproof material, which have referred to as "lambs quarter." (Why, I do not know, but that's the name.) 9. "Wyes," as we call them (we spell 'em w-y-e-s), or wye sections are placed in the mains to serve residential or commercial buildings. A four-inch service line for dwelling is usually used or perhaps a six-inch line for a condominium or apartment house, and that wye is placed at a point to make the least possible distance to the property line and part of that portion of the house or building which [is] to be served. And one more thing the inspector must do in that respect—when the feed pipe to the wye from the residence is placed as far as the property line, a redwood stake, which will not rot, is driven in at that point, so the owner will know where to dig to make his connection. One more thing under 9.—that's pipe ends, which are buried, usually are marked with indelible marker on this redwood marker, which has been driven into the ground. Otherwise if the backhoe or some instrument like that is used and if the pipe end is rather shallow, he might break it. But if he knows what the depth is, he'll be careful when down about that point. 10. Make sure that traffic controls and guides and warning devices are in conformance with requirements. (The traffic control may be such that you have to have flagmen there. When that is necessary where there's a lot of traffic, they must be there, especially on the highway like U.S. 50. The feeder highways up in the hills and so forth usually just have warning signs.) 11. See that repairing of

construction areas in the streets and highways is properly done. For example, you cannot leave ruts or rocks or debris on a traveled way, and the compaction must be good clear up to the surface. And eventually, of course, on the paved road, new pavement is put in, and sometimes to avoid differentiation, that pavement is feathered out on either side of the trench. 12. After completion of paving, see that all manhole openings are raised to grade and fitted with proper metal cover. The same is true of cleanout openings. 14. Observe construction of Portland cement structures which will be subject to heavy loads, and test cylinders should be prepared for checking the strength. 15. See that requirements of the U.S. Forest Service, the state and other agencies having requirements, are taken care of with respect to blasting and potential fire hazards. 16. Secure measurement of all pay items completed during the day and record them. (Sometimes it is not possible to do that because a manhole, for example, may be only partly completed at the end of the working hours, or some feature which is to be added as a pay item is only partly finished and can be finished the next day. In those cases you do not put down fractions for the payment amounts. Those items, when completed, will be put down on the day they are completed—or nearly completed, let us say—because you cannot complete a sewer line to the top of the trench because you have the big units one foot or one and a half or two feet high, and you try to get just as many of those as you can to a point near the surface and then cover with a temporary cover because when the final surfacing is put on, that's got to be exactly at the surface. So that maneuvering is done by a crew who comes along after all the sewer lines and manholes are in place, digs down and builds up, maybe with concrete or with special small rings or with steel rings and cover to make an exact fitting.)

The inspector also must make daily reports and furnish the same to the district engineer. These reports cover the day's weather and working conditions, such as icy roads; the contractor's crew members and supervisors; the equipment used; and the progress during the shift; the number of hours worked in the shift, including overtime when necessary; and the problems encountered; and the measurements of pay items, of course, must be taken into consideration.

The inspector also is expected to make so-called as-built notes on the plans, in case of changes or modification of original plans or specifications. For example, a manhole may be shown in a certain point on the plans, but in excavating that particular spot, solid rock may be encountered. By moving the manhole, say, twenty-five or thirty feet, the extra blasting and handwork to make a wide enough hole through the rock to accommodate the manhole could be avoided. An intersecting feeder line designated to enter a three-way manhole from the side may have to be moved because of interference with other utilities already installed. This would involve moving the manhole.

Notations and sketches are made by the inspector on his set of plans, and further explanations may be noted in his daily report. These changes noted by the several inspectors on the job, each on his own set of plans, are transferred, when the project is completed, to a master set for future reference.

Building of the seven pumping stations by the Teichert company, as I have said before, was to be inspected, but all that work would be done by Erik Beyer himself because there were seven of these stations, and they were not all worked on at one time, and there was only one crew working, and they were not scattered all over the map, as they are in putting in lines.

The maze of sewer lines and mains would require five separate crews before the job

was finished. Some of the crews were present for a shorter time than others. The crew I was with was in charge of Joe Krmpotic as chief inspector, and he was aided by Carlos Archuleta as assistant inspector. This crew was probably the largest of all of them, and at times it worked in two separate sections. That kept the inspector on the run from one place to the other when that happened.

Other crews were in charge of Foremen Cal Jones, Don Collins, Ken Baxter, and Martinez [chuckles]—his first name I do not remember. Other inspectors for the district were Victor Clyde, Mel Fodrin—both from Carson City, and as a matter of fact, former students of mine in 1924 and '29, when I was teaching in Carson City. Two other inspectors were Merl Sawyer, whose home was in the Lake area, and a man that everybody called "Awol"—I did not know his real name. Vic, Mel, and I were the only inspectors which had professional engineer ratings.

First day's work was done by the crew I was to be with. But since I could not be present October thirty-first on account of participating in Admission Day events, District Engineer Erik Beyer did the inspecting that day. I began work Thursday, November first.

There usually was one crew at work on the people I watched, but sometimes they were split up. And when that happened, it made extra work, especially if the two outfits were some little distance apart. However, when I started out on November first, there was only one crew at work. And sometimes if there were as many as seven or eight laborers and two backhoes available, they weren't split up.

Work had been started just about Erik Beyer's office on the Cave Rock Estates and consisted of digging trenches as shown on the plans to accommodate continuous gravity flow of sewage from all residences and business establishments through the service

and main pipelines to a pumping station near the lakeshore. The pumps would, of course, deliver the sewage into the pressure main located within the roadbed of U.S. Highway 50 and force it into the district treatment plant.

The main serving the Cave Rock Estates would be a six-inch-diameter, transite pipe, and all the service lines, regardless of where they wore, would be four inches in diameter. Transite pipe was specified for the job.

The sewer main for the subdivision would be placed in the main roadway except in one case where it was necessary to go over an easement. Certain residences high up on the mountain could be much better served from the easement than they could from the road.

In this particular area on the lakeshore, the road serving most of the people zigzagged back and forth up the steep hillsides and almost continuous curves, some with extra short radii. If you had a car with a long wheelbase, you should look to see if anyone was coming and try to get over to the left side as far as you could 'till you could get around the curve! [Laughs]

Fortunately, traffic was light on this roadway, but the roadway was narrow, and the presence of a construction crew occupying several hundred feet of it made travel difficult. Also the traffic had its effect on the contractor's operations, slowing him down.

This area, being a very rocky terrain with rocky hillsides and gullies, gave the contractor further trouble in excavating and holding proper grade. Digging was not often easy, as solid rock was encountered in many places. The sewer main usually was placed about four feet below the surface. Much blasting had to be done. After excavating the blasted rock, it was necessary to do considerable hand labor to clear the trench. It was also necessary to bring in fine soil, such as decomposed granite, to cover the rocky bottom and produce a

smooth grade in which to lay the sewer pipe sections.

Just prior to setting off a blast, traffic stops had to be arranged, and nearby residences, if they were occupied, arrangements had to be made for warning the people. Sometimes it was not possible to tell whether the residences were occupied or not.

Another problem of considerable consequence in laying sewer lines in these settled or partially settled areas is interference of water lines. Each subdivision seemed to evolve with its own local water system. Some of these lines were impossible to accurately define, as there was no reliable plan showing their location or composition. Most of these subdivision water mains were made from fiber pipe and were in roadways, and they were laid in no particular pattern, just where the digging was easiest. So you might pick one up almost anywhere. They were placed literally from side to side in some areas. Had they been made of steel, they could be detected from the surface by a metal detector.

Rupture of these fiber mains was thus a common occurrence, and operations had to be shut down until repair could be made. A smart contractor must make himself aware of these conditions when he submits a bid. If he is totally unaware of this problem, he could literally lose his shirt!

The water mains in the Cave Rock Estates area, however, were steel, as this was a fairly new subdivision, and they were ruptured by the sewer crew only three times. The older subdivisions in most cases relied on nonmetal lines, as I have already described, as they were much cheaper.

Before a contractor begins his construction operations, he must know what kind of equipment to have on the job. This is usually decided by his superintendent with suggestions from some of the job foremen.

In this case, Leo Tuccori, the contractor's superintendent, and Joe Krmpotic, the principal foreman, made the decision. Of course, the operators of equipment were all union members and given the classification as operating engineers. They usually have been regular employees of the contractor, in which case they are dependable people.

It might be well to describe the contractor's hierarchy, thus showing the reigning system given his crewmen. The salary scales correlate from top to bottom with the job rating. I am describing, of course, only that part of his staff which relates directly to the actual construction process on a sewer job. I am not considering loggers, accountants, and office help, and wives! In listing [laughing] this hierarchy, as I call it, Number One would be the contractor himself or the top man and the president of the firm; Number Two, the construction superintendents and managers, some of whom may be professional engineers but not necessarily required to be; Number Three, the chief foreman; Number Four, the assistant foreman; Number Five, the operating engineers and grade setters; Number Six, specialists, such as carpenters, powdermen, welders, pipe layers, concrete finishers, and so forth; Number Seven, truck drivers; Number Eight, laborers.

Description of a typical day's operation with all the details included will well illustrate what can take place on a job of this kind. It will describe the kinds of workmen and equipment and the amount of progress made in a typical day, also some of the problems and how they were cared for. I chose at random my report Number 12, and found after I had chosen it that there was quite a little trouble on this particular date. I'll go ahead and read things as they appear, practically verbatim, on my written report.

This report was Number 12, and it had three sheets, and the date of the report was

November 21, 1973. Weather at the time was partly cloudy, cool, and with some fog in the morning. The work period was seven to five-thirty. Superintendent was Leo Tuccori; foremen were Joe Krmpotic and Carlos Archuleta. There were four operating engineers, one grade setter, two pipe layers, and five laborers.

The equipment consisted of two Michigan loaders (both of them worked for ten hours); one heavy truck equipped with a crane, which was used for a couple of hours; two Poclain backhoes (one was inoperative at this time, and the other one worked for nine hours); one pavement cutter, which was required for about an hour; one power broom; and two compressors. But the power broom was used but very little; it was usually used before the job commenced and before the pavement was cut. Compressors were on hand because if you do strike rock, you certainly need a compressor to get around there just as fast as you can.

Now, in the chronological account of the day's work, it goes like this: there was eighteen feet of six-inch pipe laid between the manhole F-16-4, and that was finished by eight o'clock. That was between the manhole mentioned and a water service to Lot 196. That had been severed, and it was found at the manhole site instead of where the water company stake was placed. Further trouble of the same nature was encountered at crossings of water services for Lots 197 and 198, but the service at 199 was found where marked.

Welds and repairs to the three-quarter-inch services were made, but backfill over the service pipes in those locations had to be deferred 'till late in the day. Water was not available until the three-quarter-inch services were fully repaired. Nevertheless, there was ample moist material in the decomposed granite talus banks to shade and compact

over the pipe. I should explain what is meant by "shade." Of course, the pipe has to be laid to flow by gravity at a certain grade; it can't have high places in it nor low places. But to make that grade smooth, soil backfill has to be put in the bottom of the trench if it's rocky, the pipe laid there, and a little place dug out to put the bell down so that it will not be too high. And the first soil that's put over that has to be free of stones, because when a pipe is made of transite, pressure on those stones if against the pipe may cause a leak. Therefore, the shading, if it's done, is the first material put over the pipe. And sometimes it has to be done by hand, but usually if a loader can get good material, rock free, it's done by loader. But it is not put in great big gobs; it has to be done so that the men can use T-bars if necessary, and force some of the material up against the sides of the pipe. This shading must be done very carefully.

Using the talus as backfill, however, resulted in leaving considerable volume of unused excavation. A portion of this was moved downhill, and the balance was left on the southerly side of a cul-de-sac circle. I told Joe Krmpotic there was no good reason why it could not be left there 'till next working day, as it was almost dark, and the trench was not yet completed. The loaders were needed to complete that excavation. The day's work was finished except for cleanups by five-thirty P.M.

There's an area for the disposing of waste rock and soil at the property of a home owner, whose name I did not get at the time. He requested that such material could be used for filling a hole. The owner lives in the gulch just below the blue-green house north of manhole 16-2. Joe Krmpotic has been told about this.

Manhole 16-5 was placed just after sundown. A surveyor had another riser section under the cone section, but it was so

late in the day, and the riser was not available except way downhill; therefore, I had them go ahead with the backfill. The distance above the top of the cone in its present position will exceed by two inches the twenty-one-inch maximum allowable between the cone top and the finished surface. Due to the special circumstances involving broken pipes and other delays, I believe exceeding the twenty-one-inch by use of two plus or minus inches of additional ting is justifiable, and will not seriously affect the entrance and egress of the manhole.

Manholes are not built completely during the process of pipe laying, because the top of the manhole eventually will have to be just exactly even with the top of the pavement, and that's impossible to guess while you're going along. So you build a manhole up to a point below the road which can be adjusted—the later part of the cone can be adjusted—by adding metal sections. But the cone cover is put over it to keep soil from going down into it (the manhole).

Manhole 16-5 was placed fifteen to twenty feet short of the planned distance to better accommodate services to Lots 207 and 200. Manhole 16-5 was a three-holer, with the two legs of the channel wye each at forty-five degrees with a stein channel. Services to Lots 207 and 200 will be placed by the service crew, but they will have to place reducers in the two manhole channels heading easterly and continuing with four-inch pipe to property lines. Decision to change termination location of manhole 16-5 was made in conference with Engineer Erik Beyer before requesting the contractor to make the change.

All the manholes beginning with F-12-4 and ending with F-16-5, eighteen in all, have now been partly finished, needing only grade rings and steel corsets. Partial payment will be made on the partially built manholes.

The pay items for today's work are as follows: six-inch sewer main laid this date, total of 362 feet; wyes to Lots 202 and 201, total of two. There were no manholes built this date.

Referring back to the list of personnel and equipment, the explanation of the duties of some of the men and uses of equipment should be briefly described. The two foremen, Joe Krmpotic and Carlos Archuleta, in addition to laying out the procedure and supervising the crewmen, actually did nearly as much hard, physical work as the laborers themselves. This was especially true when it was late in the day, and much hand-shoveling had to be done to clear the roadway before leaving it at nighttime, when traffic would not be able to see the piles of dirt. I did not object myself to picking up a shovel sometimes and helping out, because it gave me a better chance to get home just a little bit earlier.

The foreman and the assistant sometimes came to the job much earlier than the crewmen, and they helped the truck driver unload the pipe sections and place them along the proposed work area for the day. Carlos was especially good at repairing broken water pipes, which were often encountered where they were not supposed to be. These two men were very conscientious about getting things done in the right way in the initial attempt. They were also very demanding with the crew members. Laborers found dogging it were immediately discharged. Carlos fired three of them the second day of operation. At one time in 1969 at the Incline area, I was on a job in which Foreman Joe Krmpotic fired five men at one time.

Sometimes the work force was split into two crews. One crew might stay with laying of the main, and the other would come along later and place the four-inch service pipes from the wyes, which were already attached

to the main; and they would extend those four-inch lines out to the property lines at a predetermined point. This predetermined point had to be established by the inspector usually early in the morning or late at night. Erik Beyer helped me do that quite often.

Property owners were, of course, responsible for continuing the service lines from their property line to their residences or places of business. It was my job, assisted by Erik, if we had the time, to go over probable areas with property owners if you could find them; and if you found the proper place, you would put a stake in the ground—that is, one of these little surveyor stakes—to mark it for the following day's work.

The property owners sometimes could not make up their minds for sure just where they wanted it, but when told what it cost to lay the lines, they usually picked the shortest distance to their areas [laughing]. When they were not found, we had to do some peeking in windows and looking up on rooftops for vents, then use our own judgment as to the best location for the marker. Actually, to the best of my knowledge, we never made any too bad mistakes. I believe there was one case where we put a line in like that, and the property owner later, before we had gone very far, discovered that, or told us there was a huge boulder between our marker and where he wanted the line, so could we put it somewhere else? So we actually plugged up the wye which we had for his place and put another one farther up the hill, which would better serve him.

Once the service lines were placed from the main out to the property line, the contractor would mark the place by forcing a two-by-four redwood stake into the ground at the contact point. The small surveyor stakes would never stay there; you had to have a big, redwood stake. This would be a problem to

get into the ground, so the way it was done, usually, a loader would till his bucket, and he would put the weight of that bucket on this redwood stake and push it right down to the presumed height. Some of these loader operators were experts at this job.

Many of the lots which were to be served were vacant; therefore, it was up to the inspector to make his own decision where the marker might go. There was no way of telling, of course, where the owner would build his house. As a rule, though, there was no objection coming from later builders; they simply had to connect their sewer—regardless of where they build their house—to that particular point.

Turning again to duties of personnel in the several categories, the operating engineers were operators of the large and sometimes complicated equipment, such as loaders, cranes, large backhoes, and they sometimes also operated power brooms and the larger drill rigs, as well as pavement cutters. However, sometimes ordinary laborers could operate those rigs.

Where the pipelines are placed within paved areas of roadways and parking lots, a pavement cutter must be used to define the width of the trench and leave smooth edges. The trenching was never done a day or so ahead but always had to be done in advance, of course, on the day the pipe was to be laid.

Although the proposed trench usually was marked out by paint or crayon on the surface, it sometimes had to be changed slightly when the backhoe started to dig, especially if by moving it over just a short distance, the pipe sections could be gradually fitted into it. If a rock or boulder occurred which was just too big to do anything about except shoot it, it would be necessary to stop operations at that point and get the compressors and the drillers

in. But drilling operation might take quite a long time, so as a rule, then, the whole crew would move up the line a ways where there were no rocky places, and start the trench and laying the pipe above this rocky area.

Pipe laying, of course, usually followed immediately behind the backhoe with a grade setter checking the grade very carefully. But the rough rocky terrain made problems; even though the backhoe could do the digging, the rocks had to be covered by sand or decomposed granite, so the sharp rocks would not break the pipe. To do this, a loader was usually employed, and in most cases there was decomposed granite nearby on slopes and many hillsides, and they could go and get a load of that and put it in the trench; then laborers would help spread it out, and the grade setter would carefully check it before the pipe could be laid.

After laying the pipe; joining smooth end to bell end, shading had to be the next operation. (The term “shading” has already been explained.) After shading—or perhaps even before shading—if the material were dry, water had to be added. Of course, compaction could not take place until an ideal amount of water is available in the soil.

There should be no rock at all—that is, rock of any size, say two inches or larger—within the first foot of backfill over the pipe. Laborers go into the trench where the fill is placed by backhoe and carefully check it for rocks for the first foot. After the first foot is filled, then some coarser material can be added and water, if necessary, and then the whackers are put to work compacting.

The loaders are usually two-cubic-yard capacity, and they're very mobile machines, and they can move around with those big tires in many places and can do many things. I've already said that a loader with his bucket loaded makes a good forcing machine to force

a huge stake down into the ground. They have many other duties also. They can go over an area and partially grade it with their bucket. This twoyard bucket can be raised or lowered as the operator desires.

Moisture content of the backfill should always be as near the optimum amount as possible in order to secure maximum compaction. Tests are sometimes necessary to check that, but an experienced person usually can tell pretty closely whether that was going to compact the way it should be. Where it is necessary and the material is very dry, it is often necessary to have a test made just to make sure you're getting the amount of water in there.

A water truck is always kept on the job to add water whenever it is needed. However, in the wintertime we find that most of the soils up at Lake Tahoe area are fairly moist; nevertheless—well, we have the water truck present.

Compacting the backfill is done in two ways: by use of whackers, and by wheel-rolling with heavily loaded loaders. This can be done especially in the upper parts of deep trenches after the whackers have done the compacting at the lower elevations.

After the pipe is laid, backfilled, and compacted in an asphaltic-surfaced roadway, new paving material has to be provided and placed over compacted trench fill. Hot paving is best but sometimes cannot be obtained, and for temporary purposes a cold mix is added; but whether it's cold or hot, it has to be rolled by a regular roller.

Before paving is placed, however, a power broom is used to clear away all soil and debris left from the trenching process. Where solid rock is encountered in trenching, a drill rig consisting of an air compressor with steel drill fittings and drills is moved in and starts drilling the rock.

Loading with explosives after the drill has finished its work, and blasting is the next step. Ordinary labor under supervision can do the drilling. The supervisor in this case is an important man, as he must know just where the charges must be placed, and the size of the charges, how deep to drill, and so forth, in order to adequately break up the rock without too much over-break. An inexperienced man can waste time by thus failing to properly place and load the charges, and then repeat drilling would have to be done. Safety precautions must be taken by establishing a foolproof warning system for passing traffic as well as for protection of the workmen. A crane is sometimes needed to lift stalled equipment or to handle heavy pipe sections on or off the truck transport. The smaller pipe sections can be handled by man power.

Thursday, November twenty-second, was Thanksgiving. There was no work on Thursday nor on Friday. Work was done every day on the following week, November twenty-sixth to thirtieth, inclusive, and considerable progress was made. Eighteen hundred and nine feet of six-inch main was laid this week; nine manholes were partially constructed; two rodholes and twentythree wyes were laid.

On Friday, the thirtieth, two crews were at work—one on the regular pipe laying on the street and the other operating on a cross-country easement between the Union Circle and Robin Circle. My daily report for November thirtieth contained four full pages. These daily reports were made up at home, evenings, from notes made during working hours and kept in a pocket notebook and were turned in at the office the next working day. Usually about one hour's time was required at home on each report. Of course, there was no "pay item" for the time spent on the reports [laughing]! I made carbon copies of all such

reports, and from these copies I am thus able to explain the daily operations and problems and prepare summaries of work accomplished for inclusion in this record for use by future historical researchers. I have approximately thirty-odd pounds of such records covering my inspection of construction activities between 1968 and 1975.

Turning back to the work, the next day's work was on Tuesday, December fourth (1973]. Three new laborers, all of Basque descent, were brought on the job to replace three other laborers who had been dismissed last Friday. These Basque fellows were experienced in pipe work.

"Choo-choo," who was acting as the lead pipe layer, was faced with a grade problem today. This occurred above manhole NF-19-5. The grade had been set by planners at 0.0062, which is barely enough to allow gravity flow! "Choo-choo" managed it okay. (I'm not sure of "Choo-choo's" national origin; he may have been Basque. I never did know what's his last name.)

The following day, Wednesday, another unmarked water service was broken by the backhoe while trenching on the roadway, and about two hours was lost in making repairs and cleaning up the mess. Although this was December, the ground was not frozen, except in a few places, as the temperatures had been quite mild. The soil was moist from earlier storms, as not much extra water had been used to aid compaction of backfill.

A deep trench section on easement required extra safety precautions in placing the pipe and handling equipment in order to protect the two pipe layers in the trench. Work this date was slow for both crews on account of the broken water line on the highway and deep trench work on the easement. Pay items were to be summarized along with those of the following day.

On December sixth, the trench on the easement was very steep, and Joe Krmpotic, the foreman, worked in the trench with the pipe layers. The pipe sections had to be temporarily held in place with rods driven in front of the collar until they could be partially shaded. The hill was so steep that the pipe would tend to slide down in the trench unless something was there to hold it.

The soil was then J-barred (the use of J-bar is for temporary compaction along the sides), and 230 feet of this steep line was carefully compacted and finished on this date. Another 180 feet of six-inch main and three wyes were laid on another part of the easement. Progress on a line in the roadway was held up by necessity to drill and blast a huge boulder.

Erik Beyer arrived on the job in the late afternoon, and he aided me in designating locations for service wyes to be installed on the six-inch main.

The following day, Friday, fair progress was made on the easement line and on the line in the roadway. However, a surveyor's error caused trouble; a curve had to be made in the trench in order to give access to a manhole already installed. This required use of several short sections of pipe, some of them curved; but the job was done satisfactorily. Everybody makes mistakes, the surveyors included.

Late in the morning, I had attempted to lay out three wye locations along the banks between two manholes but could find only one lot corner. Erik Beyer's help was obtained with his map, and we set all three points. Good progress was made by the crew this date—496 feet of six-inch main was laid and five wyes attached.

Work on the main Cave Rock road and easement was just about finished. We thought two more days' work would do it; however, we managed only one good day's work before an extremely cold spell occurred.

Monday, December tenth, 132 feet of pipe was laid, a part of it connecting the line on the easement to manhole Number 17-1, and in addition we placed three redwood erosion checks over some of the steepest part of the trench on the easement. These erosion checks were ten feet long, three inches thick, and ten inches wide. Of course, they were made of redwood because of its lasting qualities.

At this time the trench in the roadway after compaction was paved with cold asphaltic mix, which was only a temporary measure. Thus something else would have to be added in warmer weather.

On Tuesday, December eleventh, the working time was limited to the period eight to eleven A.M. on account of high winds and snow. The only work consisted of placing three more erosion checks on the lower end of the easement between Chukkar Drive and Robin Circle. The three checks placed yesterday were not inserted as deeply as they should be, and the laborers made considerable effort to reset them. The weather during the three-hour period was next to unbearable, and the job was shut down.

In addition to the work along the main Cave Rock settlement, which we had just about finished, there was more to do at the lower elevation just southeasterly of the office. This work, however, would all be done later on.

Leo Tuccori, manager for Byars Construction, ordered Krmptic's crew to start at Round Hill on U.S. 50 and lay the eighteen-inch pressure main. This was not to take place 'till Monday, December seventeenth. On that date with Clint Green (a Byars superintendent) present, Joe Krmptic and Carlos Archuleta, as foremen, with five operating engineers, two pipe layers, six laborers, and two flagmen, trenching for the eighteen-inch pressure main began at about

eight-thirty A.M. Equipment consisted of two Michigan loaders, one Poclain half-yard backhoe, one truck-mounted crane, one paver cutter, and one power broom. The trenching was delayed some at the start because of lining out equipment and placing traffic cones to outline the traffic lanes. When working on a main U.S. highway, extra care had to be taken at all times for the sake of safety.

The state Highway Department had its inspector, Jim Murdock, on the job for a full eight-hour shift. Jim said he would try to secure a state Highway "as built" set of plans, so we could use Highway stationery for referencing. It is customary, of course, on a federal highway especially, when the highway is disturbed by any outside agency or in the state highway department, to have a state inspector on the job to watch operations.

The trench was started at a point just inside the easterly edge of the pavement at the approach road intersection on the southerly side of the Round Hill Shell station. Since the required minimum cover over the eighteen-inch line was at least three and a half feet, the backhoe kept the depth of the trench uniformly at about five and a half feet.

The pavement cutter was put to work shortly after the traffic cones were in place. We found the paving to be three and a half inches thick in places and as much as eight inches where there had been an overlay on old construction. The base course was decomposed granite and not much different in character from the fill in the subgrade.

The first two hundred feet of the trench was fairly free of stones, and the moisture content was just about ideal for recompacting backfill over the pipe. By noon ten lengths of the eighteen-inch pressure pipe had been laid, shaded, and partly covered. The local TV cable was encountered in the trench and was severed at about thirty feet from the

beginning of the excavation. This cable had been laid and hand-covered, then paved over in the same area established for the sewer line. The TV people came on the job, repaired the cable; and after the pipe was laid and partly covered, the cable was reinserted in the trench at a depth of one and a half feet.

A half-inch gas line was encountered—fortunately it was not broken. And that was at a point about 148 feet from the beginning of the trenching.

The eighteen-inch-diameter transite pipe sections were thirteen feet in length, and the bell ends being about twentytwo inches in diameter. They were delivered to the trench by means of the truck-mounted crane using cables. The eighteeninch ends were forced into the bell by laborers using crowbars in most cases. Sometimes, however, the crane assisted by forcing the section being laid into the bell by pulling on the cable around it. Two hundred and ninety-nine feet of the eighteen-inch pipe was laid, shaded, and backfilled by four thirty P.M.

At a point twenty feet beyond today's work there was an underground telephone line as well as TV cable, but a boulder was found beneath them. This boulder would require blasting before more pipe could be laid.

Early in January, Byars, the contractor, put three additional crews to work in various places on the job site, such as the Glenbrook area with Men Sawyer, inspector there and with Victor Clyde, inspector on the old Lincoln Highway area in the center of the project. Another crew had started drilling passageways under the pavement on U.S. Highway 50. These passageways would contain pipelines leading from the areas above, to the highway, and on down to the pumping stations, and also, pressure lines from the pumping stations up above the highway to get into the pressure main.

Men under Joe Krmpotic and Carlos Archuleta were working on the eighteen-inch main. This crew was of such size that it was sometimes divided, temporarily, at least, into two crews— not so much on the main line, but especially when they're working on smaller service lines and smaller mains in some of these areas. This crew and equipment remained the same through Tuesday, Wednesday, and Thursday; Tuesday being the eighteenth of December [1973].

The first operation on the Tuesday was to blast the boulder under the TV cable and telephone crossing. It was drilled and shot by eight-thirty A.M. The four-inch transite conduits were broken by the blast. The TV cable, however, was not damaged. The two telephone conduits were empty, fortunately. Apparently, they had been installed under the pavement for future use. The utility companies were notified, and the trench was left open 'till repair could be made.

Laying the eighteen-inch pressure main progressed rapidly, and no more blasting was required this date. Boulders were encountered, but they were laid along the gully below the trench. At times this trench carried runoff water, and upon the recommendation of Jim Murdock, the Highway inspector, boulders thus disposed of would do more good than harm. I was wondering, though, if ecologists might not disagree! [Laughs]

Garrett Gobeli of the Sharp and Krater company took two backfill samples to check on compaction. Only ninety percent compaction was required on shoulders, but relaid base course for the pipeline that is inside the paved area required ninety-five percent. Of course, where you're breaking the pavement, each day's run must be followed up not only by compaction of the subgrade and base but by using a temporary asphalt mix of some kind to make the pavement more or less

continuous. This temporary mix often had to be replaced when the weather moderated.

Joe Krmpotic asked for instructions regarding placement of the manhole near the top of the hill (that would be just about opposite the road leading into the Bourne area). I contacted Erik Beyer about this, and he promised to be present when the manhole was placed.

Next day, Wednesday, progress was rapid in the morning but was slowed by presence of rock which required blasting in the afternoon. Thus only 364 feet of the pressure pipe was laid. Jim Murdock, state inspector, brought a set of state highway plans on the job; thus we were better able to locate utilities and drainage structures, as the Clair Hill plans, which we inspectors had to use, were not sufficiently complete. Thus far, however, all corrugated metal pipes had been placed deep enough, so they were not intercepted by the sewer pipe trench.

The following day, sufficient blasting had been done early in the morning to enable the backhoe to dig about 110 feet; thus allowing the laying of eight, thirteen-foot sections of the eighteen-inch pipe by nine-thirty. More rock was encountered and had to be drilled for a length of about eighty feet, which just about used up the full working day. Part of the crew was sent home at three o'clock.

The big Sullair compressor was used with a drill rig, and an additional eighty feet was finished by this rig; and about thirty-five feet more in another rock area was drilled using the small compressor. only 182 feet of pipe could be laid in the trench area thus far prepared. A gap of about a hundred feet was left between the first eight sections and the last six sections, which hopefully could be fully dug out and pipe laid in it the next day.

The contractor's attention was called to the drillers working without protective dust

masks. Joe Krmpotic promised to have the masks on hand next shift.

On Friday, December twenty-first, I drove in a snow storm to Erik Beyer's office and found that the Krmpotic's crew would not work this date because of danger to traffic on U.S. 50, in this kind of weather, especially. Erik said he and I could check the testing in the Glenbrook area, but before we could leave, Vic Clyde called from home about conditions at the Lake. Erik told him not to come up, because as long as I was present, I could handle Vic's crew this date.

We drove to the old Lincoln Highway area and found that crew cleaning up and backfilling a trench. The trench could be left open overnight in that particular area, as the old highway was not used by traffic. [Charles] Martinez was foreman on this crew and had three operating engineers, two pipe layers, and at first eight laborers; however, three of them were dismissed after working two hours. Equipment consisted of a half-yard Poclain backhoe, one small Case tractor with bucket, and on standby, one small crane.

Two, thirteen-foot sections of twelve-inch transite pipe, class 150, had been laid before we arrived, but presence of boulders stopped trenching 'till blasting could be accomplished. The trench at this point was nine feet deep.

Blasting had to be done twice before noon, and only one more thirteen-foot length of pipe could be laid before that time. Progress was better in the afternoon, and by two-thirty, 212 feet of pipe had been laid. About seventy-five to eighty feet of trenching was then skipped, due to boulders requiring blasting. Trenching was resumed for about sixty-five feet when boulders were again encountered; and then an additional four lengths of pipe were laid, shaded, and J-barred, but not backfilled. Blasting would be done either tomorrow (that is, Saturday) or next week. The crew did an

excellent job of backfilling and cleanup over pipe laid the day before. Sand backfill was sufficiently moist to give good compaction.

A mistake in design grade was apparent here. Leo Tuccori, manager, and a survey crew were set to work in the afternoon reestablishing proper grade. Two hundred and sixty-three feet of twelve-inch pressure pipe was laid this date. Of course, pressure pipe does not have to be laid to the same kind of grade that gravity pipe would require. The fact that there's pressure in the pipe, the material there will flow up and down over little hills and hollows; therefore, closely watched grade is not particularly necessary.

On Monday, December twenty-fourth, Carlos Archuleta and the main line crew were present. Joe Krmpotic was not with them this date. Personnel and equipment were the same as last week, with exception that two of the five laborers were sent to help out in an emergency at Glenbrook at nine o'clock. Rock present in the proposed trench area gave trouble all day. Drilling and blasting occupied most of the time, so that at day's end only 194 feet of the eighteen-inch force main had been laid.

One section of pipe had to be cut in order to be fitted to the manhole at the top of the Bourne hill. Time was thus lost in cutting and trimming the male end of this pipe to fit into the bell of the next pipe. Fitting had to be minutely secure, on account of the pressure condition when in use. This particular section could not be fitted properly before quitting time. Then it was temporarily backfilled without compacting and would be properly completed—hopefully—on December twenty-sixth.

About sixty-five square feet of the pavement in this area was badly damaged by equipment. A temporary patch of the six to eight inches of cold mix was used with consent of Jim Murdock of the state Highway

Department. Jim had to leave at four o'clock and left me to see that proper trench filling and cleanup was made. (The Highway Department people were more or less dependent on me to do things right anyway because I had worked so long for them [laughing])

The trench at the site of the manhole was dug sufficiently wide and deep to accommodate the entire structure when it could be laid. Warning barriers were installed to adequately protect the Christmas travel.

Wednesday, the day after Christmas, was a bad-luck day for the contractor. The backhoe could dig but 130 feet of trench without hitting solid rock or boulders; thus only nine lengths of eighteen-inch pipe were laid this date.

A hundred feet of blasting would be required, so while drilling operations were going on, the crew worked with the main hole area, and tore out about five lengths of pipe and reset them. A telephone line was enclosed in the pipe, and that was encountered near the manhole. I staked the surface over the line to mark its position, as it would be necessary to change direction of the pipe to a deeper area against the bank to avoid contact with the telephone lines.

Telephone lines were not the only troublemakers. A water main was supposedly inside a thirty-inch corrugated metal pipe, but we found—by rupturing the pipe—that it was not there! [Laughs] Both the Highway Department plans and the Clair Hill plans showed it there, but both were wrong. The backhoe discovered the water line, however, the bad way, at two-forty-five P.M. by rupturing it [laughs]. It was a ten-inch transite main embedded inside an eighteen-inch corrugated metal pipe. Someone notified the water company, because as I walked uphill to the water company road, I found a water company employee trying to find the turnoff,

which was hidden under the snow. It was hard to find because the power company employees in their maneuvers earlier in the year had broken off the housing top, which marked it [chuckling], and the lower casing was filled with sand. I helped dig it out, and together we managed to turn off the water.

Leo Tuccori, the contractor's manager, after considerable delay, brought in a twelve-bolt, eighteen-inch, rubber-lined repair segment. The backhoe removed water from the trench, and the repair segment was in place, and the bolts were tightened by five o'clock.

This was not the end of the story, however. When the water was turned on again, two streams of water jetted in opposite directions from under the bolted area. The water line was again shut off and the segment removed and resealed. Apparently, the rubber lining was wrinkled on one side in making the original placement. The second trial, however, after thorough tightening the bolts, succeeded, and there were no leaks. Cleanup was then done rapidly. Loose dirt and stones were piled against the bank for the night and were outlined for traffic by blinkers. Both Jim Murdock and I stayed on the job till the area was cleared and made safe for traffic. Quitting time this date was six-thirty P.M.

I believe it was this particular date when a laborer picked up a small rock containing a fair-size fleck of gold. It was passed around for others to see. Blasting may have opened a small gold-bearing vein. The excitement was only without interfering with the utilities. Much of the excavation after the blasting, however, was done by hand labor. The amounts of eighteen-inch line laid these three dates were respectively 143 feet, 39 feet, and 39 feet for a total of only 221 feet, an amount which could be placed in about a half a day in an easily dug trench.

Some people don't realize why contractors' costs are so high and why they bid so high on some of these areas, particularly where, in this case, the main line had to be placed in the pavement, traffic carried on in a proper manner, and the other utility lines which had already been placed had to be avoided.

The labor crew varied considerably. Some of the men were temporarily transferred to other crews at Glenbrook and to the old Lincoln Highway. On December twenty-seventh, Joe Krmpotic and Carlos Archuleta themselves were the pipe layers! The crewmen were split up by distress calls from other areas. Weather these three days was cold and blustery with a few snow flurries on the afternoon of December thirtyfirst. Holiday traffic also had to be protected, which meant flagmen as well as traffic barriers had to be provided.

Another problem caused by blasting was formation of cracks in the adjacent paving, some of which were an inch wide. The cracks seemed to form in some concentric circles. They were filled with cold mix and compacted in with regular pavement rollers. This cold mix would serve temporarily. At a future time in warm weather, this material probably would have to be dug out and replaced with a petrolastic asphalt prepared for such purpose.

On Friday, December twenty-eighth, I was asked by Clint Green, a Byars superintendent, if I could take time to observe the testing of pipe laid in the Zephyr Cove meadow bore under the pavement. But upon arriving there, I found that Erik had already observed the testing. I took measurements, however, of the eighteen-inch pressure pipe Green's crew had thus far installed in the bore from the manhole to the end of the casing. Jim Murdock, state Highway inspector, was on the job every day December twenty-seventh to the thirty-first. Next work day without a Highway representative was January second.

Neither Christmas day nor New Year's day was celebrated in an extraordinary fashion by Mrs. Little and me. We had no family guests and could not make visits to relatives on account of my inspection work. And I recall, we took dinner out both of these days. That was at least a little celebration.

Wednesday, January second, was a banner day for the contractor, in comparison to the three working days just past. Four hundred and seventy-seven feet of the eighteen-inch pressure main was laid without trouble of any kind, except for accidental removal of a brass station cap. Trench digging and pipe shading and backfill and compaction all were very good.

The crew was again normal in size with Joe and Carlos as foremen. And there were five operating engineers, two pipe layers, four laborers, and one flagman. Heavy equipment consisted of one Poclain backhoe, one Poclain crane for lifting large pipe sections, two Michigan loaders, and one dump truck. State Highway inspector, Jim Murdock, I found, was on vacation, and we would not see Jim again, and no replacement was present this particular day.

January third was a cold, windy day, especially in the afternoon, which caused a slowdown in the work. The backhoe had trouble getting started, and one of the loaders was down for two hours. Hand-digging was encountered for a while, but no blasting was required.

A telephone employee was present to see that the pipe crew did not disturb the telephone manhole and vault. The pipe crew kept the trench one foot from the vault. A drop inlet just below the vault was passed without injury. Two water pipes were suddenly encountered adjacent to the trench, but fortunately, neither was injured. There was no marking of any kind relating

to these pipes, and they were not shown on the plans of the Highway Department, nor on the job plans [laughs]. All compaction, cleanup, and the brooming was finished by four-thirty P.M.

The same crew and equipment was on the job the following day, January 4, 1974. By ten-forty-five, ten lengths of the thirteen-foot, eighteen-inch pressure main had been laid. At that time an eight-inch sewer line from a condominium (but inoperative) and a parallel eight-inch corrugated metal pipe were encountered. Some time was taken to try to figure how to get the eighteen-inch line in place without removing and resetting these stray lines. No more work was done this date, however, because of a heavy snow squall at twelve o'clock and a weather report portending heavy snow.

The trench was backfilled by one-fifteen, and the crew left the job. I started to do the same, but Erik Beyer hailed me on the highway beyond Cave Rock. I went with him to the old Lincoln Highway job and spent the balance of the afternoon with Vic Clyde's backfill crew Number Two. Vic was busy with his other crew. Erik said not to remove soil from the banks of the old highway, as the Forest Service would not allow it for ecological reasons.

Snow was removed from the trench by hand labor, and the backfill consisted of soil from half-frozen piles previously excavated from the trench. The frozen clods were broken up by the backhoe. The backfill was wheel-rolled to compact it. I was sure the minimum cover over the pipe was not quite what it should be (three and a half feet minimum). But the old Lincoln Highway was subjected to very little traffic—all lightweight, anyway—and the compacted depth obtained would be sufficient. Additional peripheral cleanup could be done after snow was melted

in the spring. Two hundred feet of trench was backfilled while I was on this job.

Due to cold weather and snow, there was no work on Monday, January seventh. On January eighth, I arrived on the job while it was still dark, and I found workmen placing traffic cones. I contacted all people concerned, as this was an extremely dangerous operation to perform in darkness. Arrangements were made to defer beginning of work until eight-thirty and use the hours of eight-thirty 'till five, rather than eight 'till four-thirty. These time figures were Daylight Saving figures.

There was a bad spill at eight-forty in the morning. A truckload of heavy eighteen-inch pressure pipe being moved three hundred feet uphill above the trenching operation rolled off the flatrack truck when it jackknifed. Six thirteen-foot lengths and a number of collars were damaged beyond repair. Several others were damaged, but could be used by shortening and trimming. Joe Krmpotic and I inspected a number of the others, which we found okay. No one was injured, fortunately, and no vehicle damaged. A traffic officer was present while the cleanup was under way, as some of the pipe sections had rolled downhill to the pavement. Cleanup was well done. Only 159 feet of pipe was laid this date, however.

The last three work days of the week were involved in removing structures, such as guardrail and fencing, and an eight-inch corrugated metal pipe drain, trenching and laying pipe, then replacing the structures. A new state Highway inspector replaced Jim Murdock. His name was Mr. [Jack] Larson, an elderly man, who stayed in his car most of the time on account of a bad ankle. He agreed that the structures mentioned had to be temporarily removed—that is, the fences and guardrail. The crew remained about the same, except laborers were increased on days the fencing and guardrail were replaced. Pipe

sections of short length had to be used in going around curves.

On January ninth, four six and a half-, and five threefoot lengths were placed. A short safety meeting was held by the contractor at twelve-thirty P.M. Wednesday, Clint Green in charge. (Clint was one of the superintendents for the contractor.)

Trenching progressed well this date, only three quarters of an hour was lost due to blasting of two boulders. The Sharp and Krater tester, Larry Anderson, arrived at nine-thirty to take compaction samples, but there was nothing ready at that time, as the crew was too busy loading soil on trucks which then took it to Glenbrook, where a lot of mud holes had been found and had to be filled with something of better nature. They had shaded and J-barred six lengths of pipe, but had not yet filled and compacted the backfill so that it could be tested. Larry Anderson would take samples on another project and will return to our area later on.

Excess excavation was stacked against the banks for future delivery to Glenbrook. Three hundred and eightytwo feet of eighteen-inch line was laid this date.

Work was slowed somewhat on January tenth, especially during the first three hours. Five three-foot, and five six-foot pipe sections had to be used on the curved trench while coming out of a cut section into a fill section of the highway, and going outside of the elbow of an eight-inch pressure line, which had a thrust block three feet below the surface. The telephone cables, housed in transite pipe, were underneath the eighteen-inch sewer trench for some distance across the grassland flat on the Bourne estate, and at a depth of approximately six feet. A telephone employee was present during most of the day to assist in locating the lines. Progress was thus good down the approach to the flat to within about

forty feet of the valley streambed. A total of 529 feet of eighteen-inch pressure line was laid this date.

Joe Krmpotic ordered crushed gravel for use tomorrow in laying the pipeline under the small streambed. The flow, however, was across the highway in a four-by-six-foot reinforced concrete box on the northerly side of the flat.

In the afternoon at the request of Eric Beyer, I accompanied Clint Green to the site of the tunnel under U.S. 50 at the Schoolhouse Road intersection. Seventy-seven feet of an eight-inch gravity line had been forced through this tunnel, and it was to collect sewage from the school road from the firehouse and deliver it to a pumping station, where it would be forced back into the pressure line, thence to the treatment plant. Tests under five pounds pressure were found satisfactory for this gravity line.

Friday, January eleventh (1974), upon arriving at the job site, I found the work crew had been busy a half hour before, and I asked why. They had been given orders to work on the job only after daylight (Daylight Savings having been in effect). That is, to explain it a little more, I had insisted that they work only in daylight and don't come in early. However, since the first of January, this was a matter of safety, both for the workmen and the traveling public on the highway. I was told the union had given them orders to work the hours they had previously used. My way of thinking about union interfering thus in a safety measure, would justify some kind of order by federal highway or state highway departments to countermand the union. Nevertheless, due to the lengthening of daylight hours by mid-January, nothing was done about it, although I did make a ruckus about it [laughs]!

Since the eighteen-inch pipeline would have to cross the small stream, and do so

under the four-by-six reinforced concrete box, extra precaution would have to be used. The ground adjacent to the reinforced concrete box, especially on the south side, was composed of black, alluvial, fine soil mixed with snow and some decomposed granite. I insisted that this soil be completely removed to a depth a foot or more beneath the pipe and replaced with the crushed rock Joe Krmpotic had procured and stockpiled nearby. The stockpile contained about fifteen to twenty cubic yards of inch and a half to Number 4 size.

The contractor's men claimed crushed rock was not required, except directly under the sewer line. I explained to them that the soil in the southerly approach was very apt to be unstable, and during the spring runoff, excess moisture would penetrate and soften it to the point of instability. I had much experience with this kind of situation as testing engineer with the state Highway Department. Accordingly, two feet of the crushed rock was used in bedding and partial cover or shading of the eighteen-inch sewer main as the streambed was approached, and the gravel cover was increased to two feet over the top of the pipe as ballast in the lowest part of the gully to prevent any tendency for the sewer line to float, in case of severe flooding.

Crushed rock composed the entire cover of that portion of the pipe under the reinforced concrete box. Good grade of decomposed granite soil was compacted over the rock cover on approach to the RCB [reinforced concrete box]. The grade of the eighteen-inch line began to rise after emerging from the culvert and approaching Jerry Drive. Length of pipeline laid and covered this date was limited to 351 feet. No pipe was laid after three-thirty P.M., as a series of nested boulders and solid granite for a distance of about thirty feet had to be drilled and blasted.

The blasting crew had loaded the holes with intent to blast the first thing the-next working day. The state Highway Department, however, insisted the blasting be done this date, rather than leaving loaded holes over the weekend.

Clint Green had all hands busy until five-forty-five P.M. resetting guardrail and fencing which had been removed earlier in the week. This was a long shift.

I've gone into considerable detail explaining this day's work because I feel the unusual problems presented and the means used to cope with them are especially significant.

The week of January fourteen to eighteen was cloudy with rain showers, which was an unusual condition for that time of year. I do not have a diary sheet for Thursday, January the seventeenth. Work probably was called off on account of ice out on the highway. Ice on U.S. 50, where my crew was employed at the time, would be very dangerous to traffic as well as to the contractor. Because of the wet weather, most of the contractor's men had rubber jackets, rubber pants, and rubber boots available for use when needed. I was equipped in the same way. I was also equipped with a lined and hooded Alaska-type jacket for protection on severely cold, windy days. I was also equipped with insulated high boots made of leather.

Resetting of guardrail and fence had not been satisfactorily finished last Friday. I referred to it Monday during a lull in operations due to drilling boulders and rock, and Joe sent the laborers back to improve the situation.

Laying of the eighteen-inch pressure main, or force main, as it was sometimes referred to, was finished during the four work days of this week. Personnel and equipment were much the same as usual with Krmpotic

and Archuleta as foremen. Jack Larson, representing the state Highway Department, was on hand all four days.

The usual necessity to stop pipe laying operation due to blasting interfering—that is, blasting of large boulders and solid rock—occurred several times during the four-day period. Depth of trench for the pressure line varied due to changes made during construction and location of the blow-off manhole, which was now placed directly in front of the south door and window of the Michelson's gift shop. Much time was used in constructing this manhole. Erik Beyer was present during laying of the manhole base and placing of the threefoot riser. Erik ordered that all pipes, regardless of diameter, be stubbed out of the manhole not more than one foot. This would allow for some movement at the joint of the stub and adjoining section without breaking either one in case of settlement of the manhole.

The manhole base was thoroughly cleansed before placing prime coat and the ram's neck. (The ram's neck, of course, is the binding substance—waterproof—in between the joints.) A three-foot section was placed after all the ram's neck was in place, and the one-foot riser was placed on the three-foot section, and finally a three-foot cone, which was covered with a metal plate before backfilling. All manhole parts were precast.

The bore under U.S. Highway 50 at this point accommodated six lengths of the eighteen-inch pressure line, also six lengths of an eight-inch gravity line. Jesse's crew fitted the six lengths of each size of pipe one by one, while forcing the lengths already joined through the bore on redwood skids. These skids were left in place. Thus seventy-eight feet of each size pipe was then in place under the highway, and they would lead to and from the district pumping station below the highway.

Pay items for Jesse's crew this date were thus seventy-eight feet of eighteen-inch pressure pipe and seventy-eight feet of eight-inch gravity pipe. For the entire week's output of the Krmpotic and Archuleta crew, there was a total of 1,172 feet of eighteen-inch pressure line.

Monday, January twenty-first [1974], I arrived at the site of Friday's work on the eighteen-inch pressure line before eight o'clock and found no traffic cones out. The crew was there, but suddenly moved out. Leo Tuccori, superintendent, came by and told Jack Larson (the state Highway inspector) and me that Joe Krmpotic's crew would be on the fifteen-inch gravity line at manhole U-19-2 at Zephyr Cove. I drove to the office and reported to Erik Beyer, who gave me a corrected grade sheet for this line, which is parallel to U.S. 50, but not exactly on U.S. 50.

This day's work varied considerably from what we had been doing on the main highway. Fifteen-inch gravity line was to be placed in wet meadowland, and progress was slow on account of water and saturated micaceous sandy loam. It was necessary, therefore, to set a pump to remove water for each thirteen-foot length of pipe; and crushed rock was used for bedding throughout the entire distance between two manholes, U-19-1 and U-19-2. Screened sand was used for shading and the first two feet of backfill. The balance was black, loamy soil excavated at the site. Concrete for the base of manhole U-19-1 was poured after setting the six-inch and fifteen-inch pipe stubs in proper position on gravel base, sand being used in place of wooden forms. About three and a half cubic yards of concrete was poured, and was carefully troweled, but could not be entirely satisfactory because of water oozing in; therefore, final finish would have to be done after a few days. (I mentioned the two sizes of

pipe. The six-inch pipe was from one smaller sewer main, and the fifteen-inch pipe would be from the main gravity main. A manhole can accommodate as many as four pipes if necessary, but they often accommodate three ways and more often probably just two ways. The purpose of the manhole is readily seen; they must be placed every so often to aid in removing obstructions in the lines.)

The concrete mix was furnished by Tahoe Concrete Company, and the aggregate was furnished from the Dayton area. Coarse aggregate was three quarters-inch maximum size, and a five and a half-sack mix per cubic yard was used. The brand of Portland cement was Nevada Cement. I took a slump test of the mix and found it to be approximately six inches, which appeared to be fairly wet, but for the purpose it was satisfactory. A ready-made four-foot diameter concrete ring, one foot high, was embedded in the fresh concrete, and paper cover placed over the entire pour for frost protection. The water pump was left running, but after its gasoline supply would run out sometime during the night, we could anticipate the entire area then would be flooded in the morning.

The pipe crew laid only 149 feet of the fifteen-inch gravity line from end of the stub at manhole U-19-2 to center of manhole U-19-1, plus a three and a half-foot stub of fifteen-inch gravity line on the north side of manhole U-19-1. (Now, I'm giving a lot of details here, but I will not do that everywhere; but someone studying this proposition in the future may want to know these details, so that is why I'm including some of it.) There was also a four-foot stub of six-inch pipe on the west side.

Jesse's crew was put to work late in the afternoon on the eighteen-inch pressure line on U.S. 50, but managed to lay only one thirteen-foot length. (Now, someone may ask,

“What is the difference between the pressure and the gravity line?” Well, it’s very simple. The pressure line does not have to be laid to a continuous grade in one direction. It can go up and down as long as there’s pressure there—the sewage’s just forced through it. The gravity line, on the other hand, has to be on a very definitely established grade in one direction at all times. Of course, the pressure line was necessary because the sewage that would go down to the pumps had to be pushed back by pressure in order to carry the material to the treatment plant.)

I was now at least temporarily in charge of inspection on two crews separated by a considerable distance. This would not continue for very long, I hoped. My daily report of Tuesday, January twenty-two, filled three pages and included a detailed sketch of grade changes which had to be made where the eighteen-inch pressure line on U.S. 50 was being laid. The grade changes were to get the pipe under a gas main and to accommodate a change in location of an air release valve manhole. That happened quite often. People who were there before the sewer line was put in had their pipelines here and there; we had to dodge them by going under them or over them, and sometimes we didn’t dodge them but mistakenly intercepted them and had a repair job to do.

Altogether this date, personnel on the [two] crews consisted of three foremen, five operating engineers, four pipe layers, two laborers, one truck driver, and one flagman. Jack Larson, state Highway employee, was present on U.S. Highway 50 looking after the state Highway interests. From my point of view, this was totally unnecessary. I was an ex-Highway employee of forty-one years’ experience and would consider it a part of my duty to protect the state and federal government’s interests on Highway U.S. 50 at

points of my assignments. However, the state thought differently and assigned a regular employee. I had no difficulty with Jack; we got along very well.

Equipment used by the two crews this date was composed of two backhoes, two Michigan loaders, one Poclain crane, one truck-mounted crane, one dump truck. There were also two whackers on the job.

The crew on the fifteen-inch gravity line advanced the pipe almost to manhole u-19-3. This crew also placed a cone on manhole U-19-1 with a temporary cover and backfilled to the top of the cone. Water was a problem again, but a considerable amount of crushed rock was used for bedding the pipe, and backfill was screened sand to within about a foot and a half of the surface. The black alluvial soil was used to finish the backfill. Twenty linear feet of concrete encasement was poured over the fifteen-inch pipe at stream crossing just below the six-foot-by-three-foot reinforced concrete box. Concrete was furnished by Incline Village Ready-mix and was a five-sack mix (that is, five sacks per cubic yard) with a slump consistency varying between two and four inches. It was good concrete—at least, good appearing.

Surface water was kept off the trenching project in the wet area by placing a temporary earth dam across the upper end of the six-foot-by-three-foot reinforced concrete box. Considerable water was thus ponded in the east meadow, but the temporary earth dam would hold it back for several days until the concrete would be sufficiently cured.

The wet ground crew at Zephyr Cove finished 336 feet of fifteen-inch line this date in spite of problems and delays. I spent as much of my time as I could on the Marla Bay project. I did this while building the dam and trenching was taking place on the Zephyr Cove project.

Jesse's crew laid 373 feet of eighteen-inch pressure line in the trench with revised depths, which varied up and down from twelve feet to seven and a half feet.

On Wednesday, January twenty-third, Joe Krmpotic and Archuleta with their crew put in a record day. This was due largely to nature of the soil encountered, which was finegrained, decomposed granite without rock, boulders, or pebbles. This kind of soil could be utilized for shading and backfilling directly without having to screen it. Compaction was done without difficulty this date. Backfill was consolidated by a vibratory trench roller, which is ideal for this kind of soil. It is much speedier than the whacker, and compacted just as good in this particular kind of soil.

The crew placed backfill and compacted the backfill over 1,202 feet of fifteen-inch gravity sewer line. Help, however, was received from some of the crew members assigned to another place in the system. Breakdown or some other delay would have left them without payday, had they not helped out here.

An employee of the Southwest Gas Company was present and aided in finding the line crossing the trench just seventeen feet below manhole U-20-1. Another gas line crossed the trench at Station 1 + 77 and was found by the backhoe while digging but was not damaged, fortunately, except for some scoring of the protective wrapping. The gas man wrapped the pipe with new tape. These lines are two inches in diameter, and their distribution lines made of steel, which can be subjected to fifty pounds per square inch pressure.

One crew with small backhoe removed guardrail along the highway where the line would be following through later on. Flashers were placed for the sake of safety along the

edges of the Highway U.S. 50 where the line was entering.

From this date and extending for quite a time, we would be on U.S. Highway 50; thus Mr. Larson would be present to watch things for the state Highway Department.

The next two days, January twenty-fourth and twenty-fifth, a total of 1,067 feet of fifteen-inch sewer line was laid, plus some short extension of smaller sizes leading from area of the three manholes constructed these dates. Designers had placed one of the manholes very close to the outfall from a drain. So I had it moved thirteen and a half feet to keep it out of the path of flowing water.

Jack Larson, Highway inspector, received a phone call at ten-thirty A.M. from a highway maintenance man relating to a hole in a cold mix patch opposite the Bourne residence gateway on Round Hill. I went with Jack to see about it, and we found it bad. We drove to the contractor's office and reported to Superintendent Leo Tuccori, who promised to make repairs as soon as possible. The only delay in pipe laying this date was caused by having to drill and blast a boulder.

Jesse's crew was being watched by Victor Clyde, a former student of mine and a fellow Highway Department employee, also a fellow inspector on Incline jobs. Jesse's crew was doing some testing of lines already laid. I met Vic this date at Erik Beyer's office.

Two shallow manholes, four feet and six feet, respectively, were constructed Monday, January twenty-eighth, and backfilled, and 838 feet of the fifteen-inch gravity line completed. Some delaying was occasioned in the afternoon by hard ribs of granite in the trench area. It took the backhoe forty minutes to get through it. Guardrail, most of which was within the limits of this day's work, had been removed last week but would not be reset until later on.

The big drill was brought in on the twenty-ninth to drill rock encountered at the day's end yesterday. This was really tough rock which had to be drilled and shot three times before a single length of pipe could be laid. In fact, no pipe was laid before ten-fifty A.M. In the meantime, the contractor had obtained trucks and part of Krmpotic's crew hauling in moist soil from the Glenbrook area, and loaders picked it up and widened and compacted the west edge of slope of the highway where guardrail had been removed. This area was not ready for resetting the guardrail. Protection was given until the rail was set by using flares at night and signs in the daytime.

A large boulder was drilled and shot, but another one was bypassed by using a short length of pipe to go around it. In another area, the trench for the gravity sewer line had to go under a drainage corrugated metal pipe, eighteen inches in diameter. In excavating, the backhoe damaged the pipe. I requested repair before filling the trench. Joe Krmpotic furnished a coupling band, which was the only one he could find. It was just a little too small to go completely around the pipe so that it could be bolted on. I allowed use of the ram's neck, which is a manhole seal, to seal the opening at the end of this coupling band, and allowed use of wire to hold the coupling in place. All wire was painted, and additional ram's neck was applied to all parts by heating; thus no part should be damaged by rust.

Mike Colletti, district Highway engineer, and Erik Beyer both visited the job this date. A load of hot asphaltic mix was brought in to repair several cold mix patches in the pavement on the Round Hill area. I was notified by Carlos at three-forty P.M. that a test was to be made on the bore to the north at four P.M., and I was wanted there to observe it. (Referring to the bore, a number of times

bores had to be made under U.S. 50 to get sewage from one place to another.) The test was made by Jesse and crew at the Skyland bore. Pressure was held at just under four pounds per square inch for four minutes with no appreciable loss on the fifteen-inch gravity line.

Wednesday, January thirtieth, was fraught with a couple of unusual occurrences. Surveyors had made an oddball survey in one area, and Ed Bigrigg, the grade setter, was confused. I did not yet have a grade sheet for this area so could not aid him immediately. I went to the office but could not find Erik. When I returned, I found that he had been on the job while I was looking for him. He also had the grade adjustment settled by the time I found him.

Another occurrence was an accident at eight-forty A.M. A cave-in took place a short distance from manhole 13-22-1 partly covering the two pipe layers, both of whom were of Basque descent, Mike and Jesus (pronounced "hay-soos"). They were freed by hand-shoveling by several workmen. They were taken to the South Tahoe hospital. Neither of them were seriously hurt, but Jesus was badly shaken up. They finished the day at work, but they were so stiff from bruises that they did not come to work the next day.

Another occurrence was the interception of a six-inch gas main under sixty pounds per square inch pressure. Fortunately it was not damaged. A gas service and water service were intercepted shortly after work started in the morning; however, there was no damage either.

The drilling and blasting crew were in solid rock all day on the east side of U.S. 50, and they blasted six times. They were north of the trenching crew during the afternoon's operation of the latter. All laborers were dismissed at five O' clock, but cleanup and

final wheel-rolling was not finished 'till five.-twenty. This, of course, was done by machinery. The total fifteen-inch pipe laid this date was 338 feet. The week ended with the same crew with exception of Mike and Jesus, the two injured pipe layers. They were replaced for the day by two laborers. I believe that Joe Krmptotic himself got in the trench part of the time to lay some of the pipe.

Blasting and boulders and an extra deep trench made work slow this Friday with only 226 feet of fifteen-inch pipe laid. Two manholes were completed as far as initial construction could take then. Manholes, of course, always had to be finally completed after the job was done; grade rings of different sizes would have to be placed to bring the manhole cover exactly to the top of the finished pavement. This always was done after everything else was completed on the job.

Snow started to fall about four o'clock but was very light. Since my records show no work on Friday, February first, there must have been a postponement of work on account of snow or because of ice on the pavement. Actually ice on the pavement was more dangerous as far as traffic was concerned than freshly fallen snow.

On Monday, February fourth, work was begun in the three places and progressed well in two, but was delayed by necessity of blasting in the third. This date's work began where it left off last Thursday and continued southerly 'till within about ten feet of the new site of manhole U-28-1. I recommended this move of the manhole to avoid water from an eight-inch corrugated metal pipe gutter drain. The roadway slope in this section was covered by seedling Jeffrey pines from four inches to twenty inches high. These young trees were very much too thick; they should be carefully dug and balled and used for reforestation projects.

Erik Beyer was present in the morning and delivered grade sheets for a 200-foot section covering Lots 9 and 10. A residence was on one of the lots, and both lots were owned by Judge J. D. Chapelle. There was no one home, and I needed to know where the owner wanted his services placed in order best to serve the property. I drove to the judge's office, and he returned with me and selected the sites for placing services. Sometimes when you cannot find the owner, you have to use your own best judgment, and hopefully then it will be correct.

The three sites upon which work was performed this date showed 114 feet, 197 feet, respectively, of fifteen-inch gravity main, and two wyes for Lots 9 and 10, with four-inch lines from the main to property line of nine feet and twelve feet. Work on the fifteen-inch gravity line on the fifth and sixth was along the easterly edge of the pavement, and much of it was in solid or semisolid rock.

Blasting in this solid rock had a tendency to open up cracks in the pavement itself in all directions. These were not large cracks, and had the weather been warm, as in summer, this softer asphalt might have been easily repaired simply by traffic running over it. These areas would have to be repaired in warm weather by sealing and placing crushed chips.

I spent a full shift on the job on Tuesday, but Wednesday was a bad day for me, and I blew the right front tire while half way up the Clear Creek grade. District Engineer Michael Colletti was informed of the cracks in the pavement. Total pipe laid these two days amounted to 760 feet.

February seventh and eighth, all work was done on six-inch mains and four-inch sewer service lines and on two manholes. The six-inch gravity line was laid in two places on the seventh from manhole u-29-2, north,

to rodhole C-16-1, and from manhole F-2-4, northerly for about 169 feet. Slight changes were made in locations of manhole F-2-4 and rodhole C-16-1.

On the eighth, no progress had been made until after ten-thirty A.M. on account of numerous boulders which had to be blasted. Total work for these two days amounted to the installation of 822 feet of six inch pipe, twenty-seven feet of four inch service lines, seven wyes, one rodhole and two manholes. The big drill was kept busy on the drilling for the fifteen inch gravity line along the solid rock and boulder area south of the area worked on the fifth and sixth.

On the eleventh we were back on the fifteen-inch gravity line, and we continued on this size through the twelfth. This was a dangerous area in which to work, as a cliff of semiloose and fractured rock had been left just east of the U.S. Highway 50 paving by the state Highway Department, when they were constructing the four lane road. Drilling and blasting near this cliff had a tendency to produce falling rocks. After pipe was laid and backfilled, the hand operated whacker compaction would produce the same tendency to loosen the rock because they are intensely vibrating instruments. Compaction, therefore, was done by double, or triple wheel-rolling by loaders with their buckets filled with rock or soil ballast. This operation had no appreciable vibration.

Blasting this rock area produced much loosening of asphaltic pavement as far as five to ten feet beyond the trench. This loosened pavement was removed and replaced by cold mix brought in and wheel rolled for temporary patching. It would have to be replaced with hot water mix later.

February thirteenth, Wednesday, was very cold in the morning, and the pavement was icy and slippery. Jack Larson of the Highway

Department told Joe Krmpotic that no heavy vehicles would be allowed on the slippery on account of danger to other traffic. Sanding could be done, however. Therefore, the two Michigan loaders were put to work hauling sand and spreading it. We were back on six inch pipe this date. Six hundred and eighty six feet of the six inch pipe was laid, and five wyes were installed for future service lines to Lots B, A, 29, 28, and 27.

Jesse's crew finished the bore near this area, and since there was no inspector present at the end of the day, he gave me these pay figures: eighty six feet of forty inch diameter casing, ninety-two feet of eight inch pipe, and he said that the east end was fenced , and a hole in the west end was covered for protection by three-inch-by-twelve-inch force main from the stub at the elbow of the west end of the bore from manhole U-29-2 to the Stonegate post, which was labeled "Francour" (it was a man's name), and crossing Meder and Newton roads and following partway an adjoining road, thence through a high point at Station 3+50, crossing approach of Elbeken-Francour Road to U.S. 50, and following this highway to the Stonegate post mentioned, a total length of 464 feet. These descriptions are rather bothersome, but they're given because we were not just following an exact highway or that kind of thing- they were sort of wandering lines.

The trenching and pipe laying progressed quite rapidly at first, but when Newton Road was crossed, about an hour's time was lost searching with hand shovels where a gas company man claimed a two-inch gas line was located. No line was found in this area.

Later at eleven-thirty-five A.M. a two-inch line was found by the backhoe and severed it. [Laughs] It was twenty feet ahead of the area designated. The line was under pressure and made considerable noise, and believe me, no

one wanted anything in the vicinity which would cause a spark I

Erik Beyer was present when the line was severed. The company employees arrived and made repairs, which took an hour's time. Jack Meder, who was a local property owner and a former student of mine at the Carson high school in the late 1920s, was present when the gas line was being repaired. Jack, I presume, immediately discovered there was no gas in his residence.

The contractor's crew I was with usually did not vary a great deal in types and quantities of equipment. There was more variation in personnel, especially in the common labor classifications. Joe Krmpotic was the chief foreman. Carlos Archuleta was Joe's associate or assistant foreman and occasionally took full charge in Joe's absence. I may have mentioned before something about the racial background of these two men, but if so, I will repeat: Joe Krmpotic was full-blooded Yugoslavian; Carlos Archuleta was one-half Mexican and one-half Indian. Both these men were very intelligent and made good leaders, but Joe was really tough. He managed to get good work out of any laborer or operator who was willing to try. The staller or discontent was fired on his initial demonstration of such characteristics. Both Joe and Carlos were also hard workers with hand shovels, and Carlos was an excellent repairman, especially on severed water pipelines. Gas and electrical servicemen were required when gas and electric lines were broken. (The companies furnished the men.) The fact that these two men (Carlos and Joe) were right in the middle of hard physical work themselves when an emergency occurred, or when an overtime operation was necessary in order to correct a mistake, served to gain respect of their crewmen, their superintendent, and their inspectors.

Earlier in my experience with Joe on the Incline project, he seemed to have little patience with even slightly inefficient employees. I saw him on one job fire five laborers at one time. Now, three years later, he has seemed to mellow considerably, yet remain steadfast in his insistence that a man do a full day's work for a full day's pay.

Size of the crew remained about the same unless there was trouble, such as breakdown of vital equipment or encounter of extra difficult excavation requiring blasting of large boulders and solid rock.

Friday, February fifteenth, Joe Krmpotic was not present; therefore, management of one section of the crew was left to Carlos Archuleta, and the other was directed by Jesse. (I can't remember what Jesse's last name was; maybe Jesse was the last name.) Carlos's crew laid only 208 feet of the two-inch pressure line due to necessity to blast a series of nested boulders. Jesse's crew placed two manholes, NH-11-5 and NH-11-6, both of which were seven feet in depth. Temporary removal of fencing and redwood safety planking took up some of the time. I observed one test which was made on an eight-inch line placed in the bore under U.S. 50 at Lakeridge.

The next working date was Wednesday, February twentieth. Due to a storm and icy conditions on Monday and Tuesday, February eighteenth and nineteenth, there was no work on those dates. Joe was back on the job on this date, and the crew was not split up. Four hundred and twenty-six feet of twelve-inch pressure line was placed and backfilled. An air-release type manhole was placed in the line but was moved south of the designated point on the plans in order to avoid its interference on Dudley Kline's property. Work progressed fairly well in spite of the extra narrow working quarters caused by presence of metal cribbing in the entire fill section. careful handling of

construction equipment and direction of public traffic through the narrow area was done without accident, fortunately.

One of the Harvey Gross employees complained about loose dirt on Harvey's approach road. But he was told that continuous use of equipment necessary in the area was the cause, and there would be no sensible remedy until quitting time when a mechanical broom would be used to clear the dirt spills from the road.

I spent considerable time next day, Thursday, with the two-man testing crew supervised by Jesse. On the first setup, which included the entire section from manhole 0-21-1 to manhole U-21-2, there was a bad leak. Pressure dropped rapidly from 0.5 pounds in one minute and 1.1 pounds more in five more minutes.

The second setup from the end of the line near the side of manhole 0-22-2 back to manhole 0-22-1 was found to be okay. A third test from manhole 0-21-4 to 0-22-1 was also bad, showing a loss of one and a half pounds per square inch in two minutes. The fourth test between 0-21-3 and 0-21-4 blew out the northerly three-foot section, and the fifth test between manhole 0-21-1 and U-21-3 was satisfactory. Leaks would have to be found and recheck made on the failing sections.

I also inspected the pipe laying operation of Joe and Carlos's crew. They were bugged all day by presence of a six-inch gas main which paralleled the sewer trench. Care, necessary to avoid rupturing the gas pipe, delayed operations to a point that only 485 feet of fifteen-inch force main could be laid and shaded and backfilled.

Again on Friday, the twenty-second, I was inspecting two crews. I spent most of my time on the testing, but made as many occasional visits to the pipe laying crew as I could. Upon arriving on the job at eight o'clock, I first made

a count of the pipe lengths laid out alongside the highway for the day's work on the twelve-inch force main. Twenty-seven long lengths were laid out and contained eleven thirteen-footers. Seven of the twelve and a half-foot lengths, a number of small threeand six-foot lengths were going around curves. I would have to take actual measurements of today's trench with the pipe placed in it, or do it near the end of the shift, at least.

I noticed that the six-inch water main would again be encountered, but this time would leave the trench at a depth of seven feet at a point fifty feet southeast of manhole F-1-5. The twelve-inch pressure line would be placed about a foot above the ten-inch gravity sewer line in the same trench.

Things were getting complicated, especially with both pipe laying and testing to be watched. Jesse's two-man crew made some retests of yesterday's work and found one place still bad. This crew then went to the so-called rockpile area and began testing six-inch sewer lines which had been laid by another crew. The first two tests were okay. The third test from manhole 28-4 to rodhole 15-1 was also okay. There was trouble due to imperfect circles in the fifteen-inch line, but [that] was cured by placing pressure stoppers between tips in place of the circular disc types. Three additional tests carried on all passed after stopping a leak in the testing apparatus. The pipe laying crew succeeded in laying a measured 499 feet and a fraction, of twelve-inch force main, which I called 500 feet for payment purposes.

February twenty-fifth and twenty-sixth were all pipe laying inspection jobs for me. The main highway was left at least for the time being, and work began in a subdivision area on a six-inch main and a four-inch service line. Most of this work was on a steep hillside. Due to presence of boulders and large stones

removed from the trench, precaution had to be taken for safety of traveling public on the road below. An extra flagman and caution signs were used on this account.

The hillside trench had to bypass two large Jeffrey pines, which added to the backfill problem. So much rock and boulders were present that there was not enough fine soil to properly shade and backfill the trench. This would mean necessity to import satisfactory backfill soil.

Due to steepness of the backfill trench, three-inch-by-eight-inch redwood planks, ten feet long, would have to be inserted across the finished trench to control erosion. These planks were called "erosion checks."

First operation February twenty-sixth was importing of soil backfill and placing in trench and around the trees. Start of a snow storm caused shutdown of the work by eleventhirty A.M. on that date. Slippery snow covered Highway 50, caused stalling of a number of vehicles at about 6,000 feet elevation. Four buses were also stalled in one area. They probably managed to continue after putting on chains.

Total pay items for these two days were somewhat limited but were as follows: for the six-inch gravity line, 590 feet; for the four-inch service line, 227 feet; there were eight wyes installed, and two rodholes, and one manhole with four-foot depth.

On Wednesday, February twenty-seventh, presence of nested boulders required placing and firing charge after charge. Eventually, however, the crew managed to lay and cover 396 feet of six-inch gravity main, connect one wye, and assemble a five-foot manhole. A survey crew was ordered at ten o'clock to reset hubs which were either destroyed by parking equipment or were buried in deep snow.

Thursday, February twenty-eighth, the crew managed to lay 429 feet of six-inch

gravity main, and they placed four wyes. This day was fraught with puzzling situations, as we were in the area of Manny's restaurant and service station at the foot of the Cave Rock Estates road. This character, Manny, is a physically large and strong person who acts like a local czar with respect to the handling of his conglomeration of buildings, alleys, and service station equipment. Local officials had never been able to find out how he was handling sewage from his conglomerate of buildings. Some thought he had a hidden—that is, a buried—outfall line leading out into the Lake [laughs]. However, in trenching in front of his place, no such line was intercepted. Apparently, his waste products were carried to a series of underground cesspools. A three-quarter-inch plastic gas line was intercepted, and the gas company crew spent most of the afternoon making the repair, which involved the digging of a supplementary trench eighteen feet diagonally on the east side of the sewer line, placing the new section with three-quarters-inch pipe and making a new connection to the two-inch gas main.

Members of the Nevada State Board of Health were present most of the day with the sewer crew. They were expecting to find a line leading from the conglomerate of buildings out to the Lake. However, at the depth the Byars company dug the sewer line trench, no such outfall line was intercepted.

Fortunately, all trenching, pipe laying, and backfill was finished in this area at four-thirty P.M. at which time heavy snow began falling. Because of the heavy storm, there was no more work 'till Tuesday, March fifth. There were so many buildings, pipelines, and power poles, and so forth in the settlement at Manny's that a simple verbal description of the trenching and encountering of obstructions could not possibly suffice; therefore, my daily report of March fifth consisted mainly of sketches and diagrams.

On this date, however, Joe and Carlos, who were operating the crew, managed to lay 394 lineal feet of six-inch gravity line from Manny's gas pump up the gulch easterly to the Gallerani house. On Lot 7, wyes were placed in this line to serve each of the five lots. One manhole, F-10-5, was placed in the Cave Rock Drive.

On Wednesday, March sixth, this six-inch line on the east side of U.S. 50, south of Cave Rock, was finished with adding of fifty-nine feet of six-inch gravity line, one wye to Lot Number 3, and one manhole, F-9-1. Work was then begun again on a fifteen-inch line, and at day's end 190 feet of this line and four wyes had been installed.

This day's work had an exciting and potentially dangerous beginning. The contractor decided to place manhole F-9-1 where surveyors had designated the location, rather than using the option suggested to place it thirty-five feet ahead, which would avoid excavation close to a power pole. The backhoe had only made two passes between the power pole and the guy wire when the pole tipped to the east, the end in the ground having been completely loosened. The fourteen thousand-volt lines were then forced against a Jeffrey pine near the Gallerani residence. Each of the three power cables shorted out, starting ignition of the pine limbs. Power was thus off between Glenbrook and Round Hill for approximately one and a half hours till repairs could be made.

Either the power pole had been originally set very shallow, or widening of Highway U.S. 50 removed a lot of the top soil placed around the pole. Leo Tuccori and I took some measurements, and we were convinced the last mentioned condition was to blame. The contractor assisted the power company to get repairs made as soon as possible by supplying equipment to hold the pole in place and aid in deeper excavation. After the power company

was finished, manhole F-9-1 was placed in the hillside cut without difficulty.

Snow and snow melt had caused the top two feet of soil to become too wet to compact it properly on the trench backfill; therefore, drier soil had to be mixed with wet material to properly compact it. In the afternoon, work was resumed on the fifteen-inch line.

On Thursday, March seventh, work was slowed by cramped operating room along the old Lincoln Highway and adjacent to a board fence. The one-half-yard Poclain power shovel was too large to be utilized in these cramped quarters; thus a smaller, one-quarter-yard machine was used. Also there was room for only one loader to do the backfill work. Surveyors had to be called in to reroute the line to some extent, in order to better use the heavy equipment. Hand labor to do excavating in these cramped quarters would be impossibly slow.

Eventually, at day's end the following pay items were installed: twenty-nine feet of fifteen-inch line along the upper road; ninety-two feet of fifteen-inch line along the lower road; two four-inch wyes leading from the fifteen-inch line, one four-inch wye leading from the eight-inch line, and one four-inch wye leading from the six-inch line; also two manholes, each six feet in height with flat bases and with three-way openings for three different sizes of pipe. This was kind of a conglomeration of sizes to work with this day.

The following day, work was continued in these close quarters and was further slowed by presence of a six-inch water line and a gas main, both of which penetrated the sewer trench, one line on each side. This not only slowed the excavation, but all follow-up operations. A gas company representative was present all day to see that no harm would come to the gas main. A water company man was also on the job for part of the day.

A manhole had to be moved away from its planned location because of presence of a gas stub line which was found at this point. Protective coatings of water and gas lines were partly scraped off during the trenching; these areas were given fresh paintings by the gas and water employees.

Trenches on either side of a proposed manhole location were eight to ten feet deep, in potentially unstable soil. Therefore, the contractor, for the sake of safety, placed wooden bracing to hold up the walls 'till pipe could be laid and compacted. This took a lot of time.

This relatively flat area, where the old Lincoln Highway was located, contained noncohesive alluvial granitic soil to a considerable depth. Thus the trenches were more vulnerable to cave-ins than were the rocky walls of trenches at higher elevations. Quantity of pipe laid that date was indeed very little—only 155 feet of fifteen-inch line was laid from where work left off Thursday to manhole U-32-4. This was a long day. Most of the workmen were dismissed at five-fifteen P.M. A few laborers and the foreman remained 'till six-forty-five, and I stayed with them. They were cleaning up compaction and were filling the tip of the trench with asphaltic cold mix.

Monday, March eleventh, was a day fraught with problems; therefore, I shall submit a reading of my report Number 75 almost verbatim to give a good illustration of problems encountered by a construction crew of this type when confronted by conditions in an older, built-up area.

This daily report of mine, prepared for the eleventh of March, which was a Monday, gave a list of the [consults papers] managers and laborers, pipe layers, and so forth; and a list of the equipment, which was the usual; and a list of the pay items, which consisted of

fifteen-inch gravity line with a note, “provided it did not have to be relocated”—in part, as 347 feet lay-down. And ten-inch gravity line to connect from the bore through the pavement—under the pavement—to manhole U-32-5, was four feet; and the wyres to Lots 1, 5, and 4, coming out of a fifteen-inch pipe to four-inch size—three in number; and one manhole, U-35-5, which was a three-way manhole.

Work began this date shortly before eight o'clock, excavating for manhole U-32-5, and progressed quite well for about three hours, and was then slowed down due to presence of gas and water mains paralleling on each side of sewer trench, and finally by the water main turning ninety degrees under the gas main to pass under U.S. 50, with a stand pipe and valve rising in the middle of the sewer trench, and with a large concrete thrust block placed at the level of the bend in the water line. All of these structures were just west of a head wall and at end of a thirty-inch corrugated metal pipe, and also under the concrete spillway from the corrugated metal pipe. This situation should have been given some study by the designers, but it was not.

The only apparent way to lay the sewer line was to change grade, raising the flow line about one and a half feet. This was done, but it put the sewer line for about fifteen feet within four to ten inches from the gas main, a situation in conflict with legal regulations and subject to a fine of ten thousand dollars (so say the gas people). The change in elevation also makes it impossible to keep grade of sewer line low enough to serve by gravity the low fixtures in the residence on Lot 4. Representatives of both gas and water companies were present all day. Walt Russell, manager of the gas company, drove up from Carson City and spent about one hour on the job.

The sewer line was laid, nevertheless, as far as the above named residences. Erik Beyer was not present until midafternoon due to other commitments. Possibility of changing location of the gas main to keep the one-foot space between sewer and gas has been mentioned, but who performs the work, and pays the bill, is still to be decided.

There were two repair jobs this date. At about eight-thirty, a loader, operating just, inside the gate of the McCurry residence below manhole U-32-3, severed a twin water service to the McCurry residence (which was then Lot 7), and it also led to the blue house on Lot 6. A small backhoe was assigned the job of digging out the trouble spot and digging to find the turnoff just below manhole U-32-4 on the Lincoln Highway. The water company made repairs, and the writer visited the area in the late afternoon, just as the loader was finishing the backfill. Presence of leaked water made soil and surrounding ground so wet that backfill was mostly mud. The residence's road was blocked off, but the mud hole at the valve site on the Lincoln Highway will need attention tomorrow. Gas services to Lot Number One, just below Highway 50 were apparently broken during the backfill operations. This was repaired by the gas company and rebackfilled by Byars (the contractor) at about five P.M. Wye locations were marked by laths placed west of the trench. Compaction of backfill was good, and there was a minimum of rock in the trench excavation. This sample of a full report is given just to show difficulties that can be obtained in a project like this. (All these remarks may be boring to future historians, but there they are [laughs]! Tuesday, the twelfth, was cool and windy. The two foremen, Joe and Carlos, and the two loader operators, the backhoe operator, and the grade setter with three of the laborers put in a shift from seven-thirty

A.M. to five-thirty P.M., amounting to nine and a half hours of which one-half hour was used for lunch. Balance of the crew put in about eight hours. Pay items were affected by necessity to move manhole U-33-1 about one hundred feet north of plan's location in order to avoid having it placed in front of an objecting property owner residing on Lot 4. This increased by a hundred feet the length of fifteen-inch gravity line, and reduced by the same distance the ten-inch pressure line. One advantage of the move, construction wise, enabled both lines to be set at the same level in the manhole. My first procedure on arriving at the job site was to have one of the loaders fill the mud hole left last evening on the old Lincoln Highway near manhole U-32-4 in order to make the traveled way useable; otherwise, it definitely was not useable. No oddball lengths were found in either the ten-inch nor in the fifteen-inch pipes today; therefore, the day's length measurements were simply the sum of the respective pipe lengths.

Steep side slopes and necessity to remove twenty feet of curbing tended to delay operations. Nevertheless, ninety-one feet of fifteen-inch gravity line and 321 feet of ten-inch pressure line were placed and backfilled. Manhole U-33-1 was also installed.

Compaction of the side slope was done by three men putting the whacker upgrade except for the last three hundred feet—that is, they had had to pull this whacker upgrade because it was steep. And the last three hundred feet was satisfactorily compacted by the big Poclain backhoe using the bucket arm and the bucket as a giant hammer. And he did this, fortunately, without cracking any of the pipe, but we checked to find out in a few places.

I had an emergency call at eleven o'clock from Martin Rosso, who was the construction company's foreman on another crew working

at Lakeridge. I helped him locate a manhole site and a service where the lath markers had been destroyed by equipment. I made another brief trip to Rosso's crew in the afternoon but did not have time to take measurements. I used Rosso's figures, which I received the next day—that is, figures for payment. I figured Rosso was an honest man, and I think I figured correctly. I just did not have time to get them before they were backfilled.

Apparently, no inspector had been provided for Rosso's crew, which had just begun work. But I saw Erik Beyer in the afternoon, and we discussed this, and also the proceedings of yesterday's work. I was called by the Teichert crew at two P.M. to help locate pipelines and manholes near their Lincoln pumping station. The Teichert crew was doing preliminary work removing stumps and trees, before doing the initial pouring of concrete foundations. The Teichert company as already explained, had a separate contract to build the seven pumping stations.

As yet no inspector was assigned and to the pumping station construction. I was asked by Erik Beyer if I knew of a good concrete inspector. I told him I knew of one and would find out if he could be obtained on loan from the Reno District Two headquarters of the Highway Department. I called Mike Colletti, the district engineer, and found out that Al Palander, one of the best concrete men in the state, could be used on loan, especially during the winter and spring and possibly on into the summer. An arrangement would be made to have the Tahoe Sewer District pay Al's salary to the state Highway Department. The department would then pay Al his regular salary. By doing this, Al would not lose state time toward his retirement. I told Colletti about this kind of arrangement, and that it had been done for me when I was loaned by the state to the federal government for

inspection of construction of the Tonopah airport. Everything worked out very well, and Palander came to to the job Friday, March fifteenth. He started his work on the concrete, which was poured that date, around the steel pipe which had to be placed in the Cave Rock tunnel.

We had mild, clear weather on Wednesday, the thirteenth of March, and work progressed rapidly, so that by tomorrow, Thursday, we might be as far as the mouth of the tunnel at Cave Rock. Extra precautions had to be taken to prevent rock loosened in the trenching process from rolling down to the lakeshore fishermen's area. Compaction progressed well, and the finished trench had good appearance.

Additional cleanup and patching of the paving was done at Nanny's on the latter's insistence. Anyone familiar with Nanny's conglomerate eyesore might wonder why he would be so insistent about detailed cleansing of the pavement and shoulders in front of his place! Many a camera fan has stood on the highway south of Cave Rock to film this unusual formation containing the two tunnels. The work of nature combined with the works of engineers have made Cave Rock a prime camera target. However, should the camera be turned around 180 degrees and aimed at Nanny's layout, the term "antithetical" should be applied in comparing two film views!

Variation of the ten-inch force main pipe lengths were noted. Three nine-pipe stacks of pipe were twelve and a half feet in length, which is one-half foot less than standard. Other lengths used to finish this day's work were all standard thirteen's. Therefore, the total length of 754 feet of the ten-inch pressure line had to be measured with tape.

I spent some time in the morning with Martin Rosso, the contractor's foreman on services, but he was taken off this work in the afternoon.

Thursday, March fourteenth, was a beautiful and warm day. Laying ten-inch pressure line continued for 591 feet beyond yesterday's work, which ended 240 feet from the north end of the guardrail on the south side of Cave Rock. The pavement breaker was put to work in the westerly tunnel and continuing from some distance on the north side outside the tunnel. The small backhoe was also put to work behind the guardrail digging a trench for Friday's work, but was soon taken off because of presence of large boulders which it could not handle. Fair progress was made in spite of the shortage of laborers. Joe had dismissed several of them yesterday—that is, he'd fired them—and they had not yet been replaced.

I spent a good part of the day with Leo Tuccori and his assistant, Jack, looking over proposed work on either side of the tunnel and in the tunnel itself. Location of a manhole as well as limits of concreting the steel pipeline in the tunnel were decided upon. A portion of guardrail on the south side of the tunnel had to be removed to allow work to proceed. Kinks in the railing made by roadway vehicles were noted, especially, because this should be done in case of arguments after resetting which might arise with the district maintenance people—would claim, "Well, who dunnit?" [Laughs]

Two side drains were encountered in trenching, but careful work avoided damage to them. A thirty-inch corrugated metal pipe was also encountered in trenching, but disturbing it was avoided by arranging to place the ten-inch pressure line under it. An interesting event occurred this date. Three representatives from the American branch of the Poclain Backhoe Company, a French product, were present for a short time. They discussed with the contractor a near-future write-up accompanied by photographs of the

Poclain at work in the beautiful Lake Tahoe subdivision, a probable effective advertising program. "Next week" was set tentatively for this project. (Since the placement of the main pressure line through the Cave Rock area required intense study and much detail, my description also of necessity will be detailed.) Friday, March fifteenth, the crew was somewhat enlarged, being composed of Leo Tuccori, superintendent; Clint Jones, another superintendent; and a specialist by name of Paul Franklin; the two foremen (Joe Krmpotic and Carlos Archuleta, who were the foremen); and there were several equipment operators; two pipe layers; two flagmen; and five laborers. "All hands and the cook," really [laughing], were apparently intent upon doing a finished job and a good job of getting the line through this difficult area, and with minimal complications, if possible. Traffic handling itself involved very careful safety measures. An all-metal sewer main was placed inside the tunnel area and was extended about twenty-five feet outside the tunnel on the north. The metal pipe was U.S. ductile cast pipe iron, Tylon brand. Because of nonuniform lengths of the metal pipe, the measurements for payment were taken by Joe Krmpotic and me with steel tape. The pay items were as follows: ten-inch metal pressure line outside the tunnel, 25 feet; ten-inch metal, ten-inch pressure line, 244 feet, inside the tunnel; ten-inch transite force main, 222 feet beyond the steel pipe placed north of the tunnel. All the metal pipeline within the tunnel area was concreted, and the payment included the concreting and repairing, if necessary.

The pressure manhole was placed on the south side of the tunnel where the transite pipe entered from the south and the metal pipe exited toward the north. Metal pipe was placed over a crushed rock base and, of course, was held in place by concreting, which

began at eleven-forty-five and continued through the noon hour. The last of three truckloads of concrete was delivered at twenty in the afternoon.

I made sure the aggregates which were furnished by the Bing Construction Company in Douglas County had been tested and that the maximum size of the coarse aggregate would be limited to three-quarters of an inch. To use a larger maximum size would produce voids, or would have a tendency to produce voids in the encasement—that is, the concrete encasement of the pipe. My experiences as a testing engineer came in handy many times on this project.

The cement used was Nevada Cement, an approved brand. The slump test gave values of four inches at one time and three inches at another. Garrett Gobeli, a representative of the Sharp and Krater testing laboratory in Reno, arrived at eleven-thirty to perform these tests. He made one compaction test also and a sample of the first compacted lift of soil over the pipe and another on the second lift of backfill at a point 240 feet south of the tunnel. Both were satisfactory. When the concrete was poured, he prepared four concrete test cylinders and made two slump tests.

Temporary storage of the green concrete cylinders was made in an insulated hut adjacent to the south portal of the east tunnel, and when hardened sufficiently, could be moved. Green concrete just poured—that is, the cylinders, if they're moved around, disturbed, do not give accurate test results. On the following Tuesday they were taken back to Reno to be tested by Al Palander, who was commuting. Both seven-day and twenty-eight-day breaks were requested.

The concrete pours of the encasement were done in two operations, the first being tamped under the pipeline by the workmen; the second and final layer was hand-tamped

and handfinished, then covered for protection first with one and onehalf inches of soil and then with about two inches of cold asphalt mix. There was no hot mix available at this time of year. The cold asphalt mix might have to be replaced in warm weather.

Traffic would have to be kept off the trench for a couple of days, although they could use the part outside the trench. Barricades and traffic lights were used over the trench for protection of traffic, of course.

Erik Beyer visited the area several times during the day's operation. The contractor had anticipated a long, hard day's work; thus initial work began at seven o'clock, and the finish was at five-thirty P.M. The pressure manhole was one other item of payment; it was composed of a three-inch base, a one-foot ring, and an eight-inch top.

Monday, March eighteenth, the first thing accomplished was recompacting the cold asphalt mix placed in the tunnel Friday. Difficulty was encountered in filling (a) transite ten-inch pressure pipe section, which was put in next to the ten-inch steel pipe. This was accomplished finally by using several short pieces of transite pipe to overcome some of the differences in elevation just north of Friday's work. And where there are frequent differences in elevation, you have to use shorter lengths of pipe; otherwise there would be bad vacant spaces underneath the pipe.

The trenching by the Poclain backhoe was mostly in rocky soil; therefore, fine-soil backfill had to be hauled by trucks to cover the rocky places. In fact, it took ten truckloads to do the job. The transite pipe could not be laid on crushed rock unless concrete were to be poured all around it like was done in the tunnel. Sharp rocks directly in contact with a pipe which is not held in place by concrete can very easily damage it. Then, if an electrical device has not been provided to

detect points of failure, it'd be an awful job to find the failure. (As a matter of fact, I'll vary here a little bit to say that just recently I made a trip up to the Lake area, and the manager there is a young woman by the name of Lorrie [Bingham]; and she told me that they had just installed an automatic trouble-detecting system which is tied in to the firehouse with a failing point indicated. This, then, is phoned to a company who has a contract to maintain the pipeline. That date I mentioned was in January this year, I believe.)

This particular day of which I was speaking has [a] run of ten-inch pressure transite pipe amounting to 563 feet. Two additional pay items were two four-inch service lines placed from Lot 2 and the so-called cave-in lot at Nanny's of sixteen-foot lengths, respectively.

About a hundred feet of guardrail had been temporarily removed in the Cave Rock area to accommodate part of the sewer system; and a part of it was replaced this particular shift, and the rest of it, we thought would be replaced the next shift. Protective measures to guide traffic were installed where guardrail had not yet been replaced, and we thought we had done it correctly. A small section of asphaltic dike had also been removed, and there was not time to replace it in this shift.

Upon arriving at the Cave Rock area Tuesday, March nineteenth, I was told the crew I had been working with had been transferred to the Zephyr Cove area to work on an eight-inch gravity line. I found my crew at the Zephyr Cove area. They were the two foremen, Joe Krmpotic and Carlos Archuleta; five operating engineers; one truck driver; and four laborers. Since there was no regular flagman present, the labor crew was depleted by two men who served all day as flagmen.

Work started at manhole B-22-1 and continued southerly. Water was a problem

in this area; it was once a meadowland, and a pump had to be installed in the manhole. Several truckloads of rock had to be placed for bedding the first ninety feet, and for initial cover for about eighty feet. Good sand obtained for initial cover over the rock was well whacked. That portion of the highway fill being trenched contained troublesome boulders also. After ten o'clock, however, advancement was much better, and at day's end 639 feet of eight-inch gravity main had been laid, backfilled and compacted satisfactorily. Manhole B-22-2 was built, and a six-inch stub was joined to the east side of the manhole for future connecting.

At three-thirty P.M., I drove to Cave Rock where I found a nine-man crew at work under Foreman Martin Rosso and with Melvin Fodrin inspecting. I wondered what was gonna happen in that area we left! Apparently, police (that is, the highway patrol) had complained vehemently about the way the job was left without completing the resetting of guardrail. I could only explain that adequate safety measures were in place Monday night, but I could not explain why my crew was suddenly transferred to Zephyr Cove without finishing the job. Such changes were made by the contractor's superintendents. Apparently after receiving an "eardrum job" by the traffic officers, Erik Beyer got in touch with Leo Tuccori, the superintendent, who sent the Martin Rosso crew to the area.

My crew put in an eight-hour shift Wednesday, March the twentieth, all on the eight-inch gravity line. The crew was the same as on Tuesday except for addition of a powderman. A power broom for cleaning debris from the pavement was added to the equipment. Five hundred and three feet of the eight-inch main was laid this date; one wye was placed in line to serve the Standard service station; and two manholes were set, Numbers

B-22-3 and B-22-4. The latter was moved eight feet upstream from the plan position so that the six-inch line connecting to it from the east would be on the south side of the wire fence. One two-inch water line was severed, but it was dry, fortunately, having been shut off for the winter. The pipe was repaired. A twelve-inch corrugated metal pipe was also encountered. It had not been shown on the plans, but according to a local resident, it had been placed under the fill for possible future use as a conduit for a water line. The Poclain backhoe broke a portion of its bucket at nine o'clock but continued to work, making use of the two teeth and that portion [laughing] of the bucket that was left. Drilling and blasting of two rock areas ahead of today's work area was finished before quitting time. Progress on Thursday, March twenty-one, however, was very slow due to several mishaps and due to necessity of additional drilling and blasting of the rock area. An unmarked local water line, a line which no local person knew anything about, was severed. [Laughs] And a muddy mess was the result because no one could find the shutoff, and the water company man, Charlie May, could not be contacted. I tried to get in touch with him through Lorrie, our office girl, but she had no luck locating him. He finally was found, and the water was shut off and repair made by eleven o'clock.

All local residents below the road gave us plenty of static until their water was restored! There were two other lines contacted—without damage, fortunately—later on in the day. These lines were also dry, but no one knew for sure why they were there! [Chuckles] Erik Beyer was present two or three times, trying to help locate knowledgeable people with respect to the water system [laughing]. As a matter of fact [laughing], there were very few people I found that were knowledgeable concerning that water system! These little

water districts, each with its own company, had never drawn up a set of plans, showing details. Our later experiences with the Zephyr Heights area will be detailed to some extent.

Erik at one of his visits helped me set out markers for wye location for Lots 47, 48, 49; I had already set a marker for Lot Number 17. we had some arguments with Joe Krmpotic relative to changing the plan for manhole B-23-2. Erik recommended pouring the base section to better serve the flow coming off Lakeview Drive. Later in the day, however, it was decided good flow arrangement would result by moving the manhole to the south side of Lakeview Drive. Thus the regular base section was used after all. And all this, of course, had an improvement in Joe Krmpotic's feelings in the matter.

Mild, clear weather through Wednesday, Thursday, and Friday of this week made agreeable working conditions for this time of year. Pay items for Friday, March twenty-second, consisted of 154 feet of eight-inch gravity line, which ended at manhole 23-2, where the six-inch gravity line was continued from that point for 239 feet. Placement of manhole 23-2 plus three wyes which were established in the line, one on the eight-inch and two on the six-inch, were additional pay items.

I spent about a half hour around eight o'clock with Rosso at Cave Rock Drive. I helped him affix location of manhole 10-5 and the location of the service for Erik's office. I left Rosso and drove to the Glenbrook area, where the driller was again employed in a tough rock area. In the meantime, the backhoe, accompanied by the labor crew and the gas man, spent considerable time trying to locate the principal gas main. After about an hour, it was found about thirty feet northerly from where it was shown on the plans. Fortunately, it was discovered without damaging it. After

a second spell of drilling and blasting, the crew managed to lay a length of six-inch and eight-inch pipelines, listed above.

Erik Beyer arrived in the afternoon with enough ribbon to tie around our location stakes for wyes placed earlier, which would better define them in an area where several varieties of surveyors' stakes were still in place. Backfill and compaction was satisfactory—cleanup was well done. It was thus left in very good shape for the convenience of weekend traffic.

I discovered that much of my remaining inspection information omitted names of streets in the Round Hill to Glenbrook project. I phoned Lorrie Bingham (district manager) to get permission to examine the plans in her office at Cave Rock, so that I could correctly identify names of the areas I describe. My notes would refer to Plan, Sheet (so-and-so) without giving, of course, the name.

Lorrie's office girl stated that Lorrie was on a two weeks' vacation, and only Lorrie could give permission to examine the plans and office files. I arranged with Lorrie to examine the plans Thursday, February seventh, I believe it was— maybe it was seventeenth. I spent about two hours securing the information I needed and also interviewing Lorrie about her own experiences and why she became district manager.

In addition to possession of all the attributes of an efficient woman executive and business manager, Lorrie is blessed with a delightful and friendly personality. She is a tall and stately young woman with good figure and good looks. She told me she is thirty-three years old. She is known as "Lorrie" to everyone and is considered by her board of directors and people of Nevada-South Tahoe area to be ideally suited to her job. Actually, Lorrie is the only known woman manager of an entire regional sewer district. She told

me that her salary [is] as much [or] above the median salary of women managerial executives in all walks of life.

Lorrie's maiden name was Lorraine Thomson. She was born in Hughson, California, a small town, but it is noted as the largest cling peach exporting town in the United States. She attended grade and high school in Hughson and started her business career as a bank teller when but seventeen years old. She had no college education.

Her continuing business experiences were in public relations and in advertising and eventually mostly in the administrative areas. And most of this took place in the San Francisco area. She came to Tahoe in the fall of 1973 and was almost immediately hired as secretary to the district engineer, Erik Beyer, who was in charge of the construction of the sewer project.

Through her work with Erik, she became thoroughly familiar with the entire sewer district from the Nevada-California state line to Glenbrook. She was thus made "acting" business manager in October of 1974 and was advanced to chief administrator in December of that year. And she tells me that all of her work is with male people; there are no females in that sewage disposal area, except Lorrie.

Her advancement was no doubt due to her intelligence, personality, diligent work, and executive experience. Lorrie did not give me much about her personal life, and I didn't insist that she so do. She apparently was married at an early age, and she has two boys, ages twelve and fourteen, and a girl, eight years old. She was divorced, I believe, at the time she arrived at Tahoe. She has had boyfriends while she's been there, but she did marry again on February 17, 1975. She told me, "Oh, my gracious! I forgot that today is my anniversary!" She is now Mrs. Lorraine Bingham. Her husband works in one of the

clubs at Stateline. Her avocations are reading and playing tennis. She and her husband also are intent on buying first editions—not the kind well publicized by famous authors; rather it's from authors whose writings were not so voluminous, nor so well distributed. They thought by getting the lesser known authors and their first editions, they would have something which few other people have ever tried to obtain. She has great respect for people with whom and for whom she works, and she immensely enjoys the Lake area and hopes she never has to live anywhere else.

Now turning again to construction operations, the first three days of the week, March third to fifth, were very busy ones for me. I had two crews to observe. The crew working under Joe and Carlos were on U.S. 50, setting six-inch mains, manholes, and wyes to serve adjacent lots. The other crew under Foreman Martin Rosso was sent to the upper end of the Cave Rock Estates where they had begun to place service lines for wyes to the lot property lines. However, Rosso didn't start there; he was first going to work down on U.S. 50 in the vicinity of Nanny's complex to place lines to his restaurant and office. An argument with Nanny became so heated with respect to location of the lines that Nanny left the area, and I took him to the Lake location first mentioned in order to prevent more trouble. (You know someone who'd like to interview that guy, Nanny? [Laughs] He's a character of a kind!)

Nanny had an officer present from the sheriff's department, and he made several threats to Rosso. The officer was asked to come there to observe the goings-on, I presume. As a matter of fact, the termination of location of Nanny's service lines was deferred for such time as normal human relations could be established with him. Erik Beyer finally

succeeded in making an agreement with him, but actual placing of the lines were deferred for several weeks.

Rosso's crew was very small, consisting of Rosso himself, one backhoe operator, and one laborer. This small crew managed to lay sixty-one feet of service lines to three lots, doing excavation, backfilling, and compaction satisfactorily.

The next day, I discovered that the markers for position of the services at property lines, which, of course gives the contractor information where to put those wyes—those markers had been removed, and I know we put them up. They had been set by Erik Beyer and me last November. I found them all in a neat pile near one of the residences. Children apparently had pulled them and used them for some kind of keepsakes.

I secured my field book and showed Rosso my figures for distances and locations of service lines and left the book with him. Ordinarily, we write the service line number, or wye number, and tell how deep it is to be, finally, after it's in. We also tell how deep it is located at the property line. We don't know for sure at first, but when they're put in, the depth varies; and that gives the owner and his crew when he puts his own lines on his property—it gives him good information to know just exactly where to do it. Usually those markers, after the wyes have been put in and the service lines dug, are made of two-by-four redwoods about four feet long. They are put down with the aid of a loaded bucket on the backhoe; we just simply put that bucket on top of it and push down to about within a foot of the ground, and children certainly can't get that out of the ground. But (it) does mark the place where the property owner is to dig. Many of the property owners were living at the time right on the property, but there were many, many unoccupied lots—lots which

had been sold but had never been occupied, and some lots which had not yet been sold by the real estate developer Mel Fodrin took over Rosso's crew on Thursday, March twenty-eighth, and gave the measurements and phoned the measurements to me that evening, and I included them in my report for today. Krmpotic and Archuleta's crew were on U.S. 50 these three days; and in spite of some trouble with hard ground on the twenty-fifth and solid rock to blast and excavate on the twenty-sixth, they made considerable progress. The work included installation of six manholes, laying of 1,740 feet of six-inch gravity sewer main, and installation of eight wyes. Manhole Number 24-2 had to have a specially designed base poured to provide special installation positions to accommodate a steep inlet angle from a feeder pipe coming off a side road. This pour, of course, had to be of fresh concrete and sand bags were used to help make the forms.

Cold mix blacktop was used to pave around the manholes after they were all backfilled and to resurface temporarily all trenched areas on both U.S. 50 and on the Cave Rock projects.

Thursday, the twenty-eighth, was the last day worked in March because of a quite active snowstorm which hampered the day's progress and shut down further work 'till Wednesday, April third. I might remark here that all workmen, their bosses, and also the inspector had to be well dressed for this winter work; nevertheless, a persistent snowstorm could curtail the work, especially on main highways on account of the safety to traffic as well as to the workmen. An icy highway, for example, usually is always cause for deferring work and shutting the job down until conditions changed.

My own clothing might be mentioned. It included thermal underwear, thirty dollars

per suit; woolen shirts; wool socks; insulated, waterproof, hightop lace boots, and tightly woven for protection in extreme cold or blizzard conditions; an Alaskan-type, fur-hooded, and lined jacket—the price tag for this jacket was better than sixty-five dollars, as I remember. For a complete outfit, the total outlay—counting extra underwear, extra pants, and shirts, socks, and gloves or mittens—amounted to something in the neighborhood of two hundred and ten dollars.

In spite of weather conditions Thursday, the twenty-eighth, my crew installed 553 feet of six-inch gravity main, five wyes, and one manhole.

Next working day was Wednesday, April third. The backhoe started digging at seven A.M., but some of the workmen, especially those who lived in Truckee, were quite late due to necessity to use tire chains all the way from Truckee to Kings Beach.

Six-by-six-inch wyes had been designated on the plans presumably to serve the fire department buildings, which would create greater flow than from an ordinary residence. The same condition was true at the Zephyr Cove commercial area, which was provided with six-inch wyes Wednesday, March twenty-seventh. Erik Beyer was present at the fire department area and insisted on use of the six-inch wyes in spite of Joe Krmpotic's argument that the four-inch wyes were large enough. My picking agreed with that of Erik. Four hundred and forty-nine feet of six-inch main, five six-inch wyes, and one four-inch wye were laid, and two four and a half-foot manholes were placed.

Cold, windy weather coupled with bad conditions were cause for deferring work for the Krmpotic crew 'till Friday, [April] fifth. on this date, work was done in two places, namely, on a portion of the highway from the fire station to the Whittell school, and at

the beach area westerly from the Marla Bay pump station. Work on the latter area was confined to backfilling a trench containing a six-inch line and clearing rock and debris from the owner's lawn and from an additional area adjacent. Where cleanup and backfill was satisfactory, the lawn was left in such condition at the trench and adjacent to it that an entirely new lawn probably would have to be installed—this work, by the way, had been done by another crew.

Progress on the Schoolhouse Road was zero in the morning because a gas line crossing the proposed trench was set on solid rock. The rock had to be very carefully blasted, and removed in part by handwork, before effective construction could continue. Actually, there was not too much work done at this time on the Schoolhouse Road. Also the gas line was exactly on the spot designated by the designer for manhole B-10-2. By day's end the pay quantities were small, amounting to 175 feet of six-inch sewer main, two four-inch wyes, and one manhole. In addition, the work on the lawn was paid for by computing the sum of total work—pay items—there. Joe's crew probably was accredited for making a more nearly complete job, as the pay items were already in place; and Joe's crew established them in satisfactory condition.

Monday, April eighth, rock was again uncovered at shallow depth by the backhoe. The drill rig was put to work, and the first blasting was at nine A.M.. After clearing the trench, nine thirteen-foot lengths of six-inch main were laid, but more drilling had to be done to get under a four-inch water main and under a one-inch plastic electric power service. Pipe laying, after clearing the trench, was concluded by about four-thirty; thus a relatively small total length of pipe laid for the day was 273 feet. There were no wyes and no manholes, although the question came up

about moving manhole 10-2 to a location that would better serve the line coming off an easement. A solution to the problem would be deferred until later because the backhoe was moved at four-thirty to begin trenching in the Skyland subdivision, where the crew would begin work on Tuesday.

Later in this afternoon, I spent enough time with Erik Beyer to measure and stake seven wye locations on the west end of Willow Drive, which is the most southerly of the streets of Skyland. This date, April eighth, we thought would probably end Krmpotic crew's work on U.S. 50 and other nearby areas. However, later in summer, this crew would be again assigned to the Schoolhouse Road and some nearby easements. The Skyland subdivision lies between Highway U.S. 50 and the Lake. It is a partially flat area with some high ridges in places, but in general it slopes toward the Lake.

Geological study of the area indicates a period of glaciation in which, particularly in the southerly part, deposition of huge granite surface-eroded boulders brought downhill by the ice flows and what must have existed at that time some relatively flat terrain. Whether or not this was a side moraine or a terminal, I am not sure. This was deposited at the edge of the receding glacier; whether it was at the side or the end, I do not know. In eras that followed, alluvial decomposed granite washed down from easterly mountain slopes in these depositions, to which was added a small amount, perhaps, of water-transported sandy materials near the edge of the Lake. Beach sands at the Lake vary; and as the Lake moved up and down slightly, these transported sandy soils served to partially cover, and sometimes wholly cover boulders near the edge of the Lake. Thus the surface in such an area gave the appearance of suitability for a community, like housing development. And of course,

the developers would put it anywhere, I guess—actually on top of a mountain full of rocks or—but this looked like it was ideal, presumably.

The Byars Construction Company moved in on April ninth, starting on Willow Drive. They almost immediately ran into trouble with attempts to dig the deep trench, which was required, on this street. These hidden boulders stopped all trenching on the street until a heavy drill rig and blasting crews could be put in operation there. The regular pipe crew was moved to Red Fir Drive and did succeed in laying 418 feet of six-inch main, placing six wyes, and assembling one manhole. Blasting of nested boulders to remove enough of their fragments to produce a trench with relatively smooth grade is more difficult than to drill and blast and remove solid rock.

There was difficulty also because of the presence of many residences. The powder charges had to [be] lessened to prevent damage to adjacent property. This also slowed the operation.

Of course, in both rock and boulders, a bedding of sand is required to make a smooth grade and prevent rock or boulder particles from coming in direct contact with the transite pipe.

There was not a single pay item credited to Willow Drive all week. An extra-large drill was at work the entire time after Tuesday on the street. Boulders would not be broken sufficiently when first drilled, and blasting thus was repeated. The crew was split up, and some pay items were counted on Red Fir and Myron Drives. The paving on all these streets was in very poor condition to begin with, and was almost useless as salvageable material.

Condition, along with severance of a water line and a gas line and contact with a leaking gas main, added to the woes of the

work—woes of the week—either way you want to express it. Personnel was increased to the point that by Friday, in addition to the two foremen, Joe and Carlos, there were eight operating engineers (those are the people who operate the equipment); two truck drivers, who were classified differently; two pipe layers; one powderman; one apprentice driller; and three laborers—a total of nineteen.

Two crews were at work Wednesday and Thursday, and three on Friday. It was my job to watch all of them, but the blasting crew did not require much attention. Erik Beyer was on the job several times, and he assisted me in setting stakes to mark entrance points of service lines at the property lines.

Due to the plague of trouble, the pay items for the entire four days on Skyland amounted to only the following: 977 feet of six-inch main, 183 feet of four-inch service lines, four wyes, two manholes, and two rodholes.

More progress was made the following five work days in the next week. The sum of pay items then were 509 feet of six-inch gravity main, seventeen feet of fourteen-inch pressure main (I might remark right there, there were both pressure mains and gravity mains in some of these sections, and sometimes both could be put in the same trench, but not always). And there was 104 feet of four-inch service lines and forty-nine feet of four-inch deeply angled risers from the deep trench. Six-inch gravity line is down there maybe eight or nine feet, and it would be a very difficult job to dig a trench from a depth of nine feet over to the property line because you would have more big boulders all the way to blast. Therefore, an angled four-inch pipe is placed down there at the wye, and it [is] brought up to within about three and a half or four feet of the top of the grade. And from there on in to the property lines, there are not so many boulders encountered. There

were fourteen wyes put in, and one ten-and-a-half-foot manhole. That ten-and-a-half-foot manhole, of course, was in the deep trench.

First three work days that week were clear and fairly warm, but a cold wind and some cloudiness occurred on Thursday and Friday. Working hours were nine hours or better each day except Friday, which was an eight-hour day for all employees except the two Mexican pipe layers, who worked only seven hours.

The deep boulder-infested trench on Willow Street gave continued trouble. A plan was developed there where drilling and blasting was done in relatively short sections, in which pipe was immediately laid and partly backfilled right behind the excavation. Cave-in danger was critical; therefore, vibratory equipment could not be used for compaction at depth. The backfill from blasted material also [was] screened to remove all particles larger than three inches in diameter. And additional sandy fines were imported from other sources by trucks. As I recall, it was the idea of the contractor's men to bring some beach sand up, but for ecological reasons, that was denied. Due also to deepness of the trench and narrow surface working area, the trucks were used to haul excavation from where it was dug around to lower end of the road by a roundabout way. Screening could not be done at those points where excavation was piled along the open trench; there just was not room.

Deepest portion of the trench after shading and partially backfilling had to have the compaction done by hand tampers. This trench had to be considerably widened in the upper half to prevent cave-ins. After initial compaction by hand, the trench was partly filled in about two and a half-foot layers, and compaction was done by a large loader with his raised bucket filled with about three tons of soil and gravel. This kind of wheel-rolling really did the job, as shown by later tests.

Care had to be used by the loader to avoid the angled four-inch risers which connected with the four-inch sewer lines leading to the residences. The four-inch lines from the top of the risers were for the most part in soil without the boulders, as those lines were only about three and a half feet deep. It was necessary, however, to do some minor blasting in a few cases.

Watering of the backfill of all trenches was done mainly with garden hoses. Most of the pay items for the week were located on Red Fir and Myron drives.

In some of these Skyland areas, there were two lines (two sewer lines). A fourteen-inch pressure line sometimes could be placed alongside a six-inch gravity main, if digging was easy enough so that you didn't contact too many boulders and rocks—so much rock. The pressure line, of course, came from the pumping station, which gathered the gravity flow sewage and forced it uphill into the large pressure main on U.S. Highway 50.

Cold-mix paving was spread over the surface of compacted trenches and was compacted by rollers for temporary repair, after first cleaning soil and debris away with the power broom.

The following week was short one working day, Wednesday, the twenty-fourth, on account of a heavy snowstorm which started shortly after three P.M. on Tuesday. The work this week continued with an extra large crew due to more deep trenching on Willow Drive. On Thursday, the crew was cut down because the large Poclain backhoe was in for repairs. A smaller backhoe was obtained, and work was confined to putting in services to twelve lots on both sides of Willow Drive.

One difficulty this date was due to bending a water service so badly that a section of the water pipe had to be replaced. All services on the north side had to cross under a water

main, and all services on the south side had to cross under the gas main. Fortunately [chuckling], there was only one bad bend.

I was called to Lincoln Park Thursday afternoon to help locate a line to a manhole for one of the property owners.

On Friday, there were sixteen men in the crew, and it was split with most of them on the main lines and the others on services only. The large crew had to place two manholes. The bases would not fit angles at which pipe had to be brought in. So there we were again with a situation in which the standard bases could not be used, so concrete would have to be poured using sandbags as forms out around the outer edges. This kind of condition was often encountered throughout the job. Long working periods for all four days of the week were necessary; they were nine to nine and a half hours long. Friday's work by the main crew required work at the manhole junction points. There were eighty-eight feet of fifteen-inch gravity main laid and eighteen feet of six-inch main and a short section of fourteen-inch force main that was eleven feet long, which wasn't a whole lot of pipe laying during the week. A Galion crane was added to the equipment for handling the heavy fifteen-inch and fourteen-inch pipe sections. The fourteen-inch pressure lines were particularly heavy because their walls were much thicker even, than those of fifteen-inch gravity lines.

This week's work finally finished all of Willow Drive except one service line where boulders would require blasting. This would be done next Monday. All crew members, the foremen, and superintendent Clint Green, deserved credit for completing this trying and very dangerous deep trenching and pipe laying without injury to anyone.

Following is a summary of pay items covering the entire four days' work of this week: there was six-inch gravity main, 620

feet of fourteen-inch pressure main, and 739 feet of fifteen-inch gravity line. There was 5 7-1/2 feet of angle risers and 659-1/2 feet of four-inch service lines, fourteen wyes, four manholes, and one rodhole completed during this four-day week.

On April twenty-ninth to May third there were full five working days, and they were mostly mild and sunny. The work crews under Krmptic and Archuleta varied in size from eleven to fifteen. On May first, Joe Krmptic was in the hospital for a single day, but he was present the other four days. The total working force was sometimes divided, with one section on the main line (or lines) and the smaller section on the service lines.

The equipment varied somewhat. When two crews were busy, two backhoes were used; at least two Michigan loaders always were present, as well as a compressor for drilling, and at certain times a power broom for cleanup. Trucks were called in when needed. Then large, heavy pipe was being used, a crane was added.

Willow Drive was finally finished except for repaving, on April twenty-ninth. It took all day for a three-man crew to put in twenty feet of service line to Lot 221 on account of repeated blasting necessary on a big boulder nest, and also presence of some solid rock near the property line, with the added nuisance of getting under a two-inch gas main which had been laid on the top of the solid rock. Extreme care in blasting was necessary to prevent injury to the line.

The main crew worked on Ponderosa Drive and put in 581 feet of six-inch main and ten wyes this date; they also installed two manholes.

All of Tuesday was spent on Ponderosa Drive, mostly on four-inch service lines serving ten of the lots. Sixty-eight feet of six-inch gravity main was also laid, but this work was slowed by

presence of rocks and boulders requiring some blasting. I had to spend some time with Erik Beyer, placing markers for service lines along Ponderosa Court and on the easement between court and the next street below.

Leo Tuccora (general manager) had the cleanup and paving crew at work in the Skyland area thus far finished by the sewer line crew, and I looked over that work occasionally.

On Wednesday, May first, a smaller than usual crew of eleven men under Carlos Archuleta were at work on Ponderosa Circle and the easement below it. The circle was in some places very tough digging, but they managed to get through the rock and boulders, to lay 337 feet of six-inch line, and to place four wyes and construct a manhole seven and a half feet in height because that particular trench there was very deep. In trenching on the easement below the circle, two Orangeburg-type pipelines leading from the Carl Beyer residence to a septic tank were severed and had to be replaced. The plumber who had put these lines in was on the job to warn us where the line was but had forgotten just where they were. As a consequence [laughing], they were broken!

A number of shrubs and perennial plants on the Beyer property had to be moved to a location on the west side of the circle. I instructed the workmen to move them carefully with a ball of soil, then sand bedding around them, and giving them plenty of water to protect them 'till the owner could move them to permanent positions.

The following day, [May] second, work continued on Ponderosa Circle and the easement below it; and more than two hundred feet of six-inch gravity main was placed on Alpine Drive. A nine-foot manhole, C-7-1, was placed on Ponderosa Circle, and thus, was fitted with two manholes; there were

seven wyes and a total of 397 feet of six-inch main laid.

I spent the first hour and a half upon arrival placing markers for wyes and services. I had help from a property map furnished by A. M. Smith, the owner of Lot Number 150 on Alpine Drive. The markers had to be placed at least a day in advance of construction. Erik helped me when he could on this.

On the day before, after working hours, I had contacted some of the property owners along Tahoe Drive and found it necessary to rearrange some of the proposed service lines. This date, Erik and I looked over several problems with service locations and after conferring with property owners, decided to make necessary changes with their concurrence. We succeeded in making arrangements to construct an entirely new main line in an easement, which would be granted by at least two property owners. This easement would better serve certain properties than to try to do it on the street.

Work continued on Ponderosa Circle, however; also on Alpine and Tahoe drives on Friday, May third. Workmen were again split into two crews. The main line crew placed 407 feet of six-inch line and three manholes and two wyes. The four-inch service line crew laid three lines, a total length of thirty-nine and a half feet. Presence of boulders required some blasting.

Sunday morning May fifth, I called Erik Beyer about problems with manhole C-6-3 and marking wye locations on upper Tahoe Drive. We would meet with Joe Krmpotic on these subjects Monday morning.

Summary of pay items for the week (that is, the entire week of April twenty-ninth to May third) were as follows: six-inch gravity main line, 1,790 linear feet; four-inch service lines, 256-1/2 feet; twenty-four wyes placed; seven manholes.

A lot was accomplished on Skyland in this five-day week of May sixth to tenth. Weather was ideal, being free of storms and fairly warm, and for the most part was clear, except for some cloudiness Thursday and Friday. Size of the work crew varied from fifteen to seventeen, counting Joe and Carlos, who seemingly did as much actual labor as anyone else in the crew.

A record of the pay items I shall read first instead of last, this time, for this new week's work. It indicated how much was accomplished. There was 2,760 feet of six-inch gravity main, 553-1/2 feet of four-inch service pipe, twentyseven wyes, six manholes, and one rodhole placed. Work was started and partly finished Monday on Tahoe Drive, Alpine Drive, and Ponderosa Circle. All three areas were opened, and considerable was accomplished in spite of severance of water lines on Tahoe Drive. And one of these water lines was not repaired, then, until late in the afternoon when the water man finally arrived and found the proper shutoff, but it took him most of the day to do it. These little water companies really gave us problems!

The opened Tahoe Drive trench could not be filled completely on account of the water, and there was just too much mud and water. Also too much trench had been opened to properly finish on Alpine before quitting time. Barriers and flashers were installed for the sake of safety. Erik Beyer made several trips to the job to assist in locating new position for a manhole which would not serve the newly located line on the new easement, which was put in to serve six of the lots. Placing of service to Lot 202 on Ponderosa Circle finally finished that area, except cleanup and paving.

The next two days, Tuesday and Wednesday, thirteen service lines were laid to lots on Tahoe Drive. All but three of the lots had residences built and occupied. Better

than a thousand feet of six-inch gravity main was laid on Tahoe Drive, Lynn Way, and upper Deercliff Drive this one date; and two manholes and one rodhole and thirteen wyes also placed these two dates, Tuesday and Wednesday.

I spent time Wednesday setting stakes for wyes and service locations on upper Deercliff. There was a question about placement of a service to Lot 83 on Deercliff. The contractor's crew worked for a short time in this area during the winter (one of the crews), and I had to contact Men Sawyer, who was the inspector in this area at the time.

A water service was severed again, and the house it was serving could not get the water to flow after the pipe was repaired—tried a good many ways to do it, but it simply wouldn't flow. A good part of the afternoon was spent by parts of the crew trying to locate an air bubble or a pebble in the line, which was shutting off the flow, but no success was had. A hose was therefore laid from a neighbor's house to supply water until the plumber could be obtained to solve the problem on Thursday.

Upon arriving at the job site at seven-thirty on Thursday, I finished setting points for service lines on upper Lynn Way. Erik Beyer arrived about eight-thirty, and we had to make some changes on the service line to suit the convenience of a property owner. Work on Deercliff Drive was slowed by necessity to drill and shoot an extralarge boulder. Progress on Lynn Way was good, as the digging was mostly in decomposed granite sands. At the end of the day, 786 feet of six-inch gravity line had been laid on Myron Drive, but only twenty feet on Deercliff, on account of the boulder. One manhole on Deercliff and another on Myron Drive were placed, and several wyes on Lynn Way, plus about fifty-two feet of service lines.

On Friday, the tenth, two crews started to work, but the operator on the service crew had to leave early because of an emergency. This crew had laid only four service lines when they had to quit, and the men were transferred to the other crew working the six-inch main. This day's work was performed mainly on Lynn Way and Myron Drive, but one wye and eighty-eight feet of six-inch line were laid on Golden Mantle. The plumber hired to repair the water line on the west side of Lynn Way arrived too late to do much on Thursday, but Friday he managed to clear the line by blowing out the sand which was the critical thing that stopped the flow of water. Erik Beyer was present in the morning and helped me place stakes for services on Golden Mantle, which would be worked on next week.

Fairly good progress was made during the week of May thirteenth to seventeenth because of less real troublesome problems. When I arrived on Monday at seven-twenty-five A.M., I found Martin Rosso waiting for me. He had trouble on the Cave Rock Estates area because the stakes marking the service location from the wyes to the property lines had again been removed by children [chuckles]. He also had my field book in his possession, but I took time to help him measure the distances I had marked in the field book. I am not sure who was his inspector this date, but whoever he was he could not have helped Rosso in the same manner which I did.

Activity on Skyland was quite intense with two backhoes at work and fourteen workmen in various classifications. I managed to keep up with then. This workday was nine hours long. Volume of pay items will not be shown separately, but will be included in the week's total.

Principal work this week was on Myron Drive, Lynn Way, Golden Mantle, Deercliff, Ray Drive, and some work on Ponderosa

Drive, and on an easement between Ponderosa and Skyland Drive. The crew size varied from fourteen to twenty-four during the week, the greater number being used for special purposes, such as operating a crane to lift heavy pipe sections used in laying pressure mains. The use of trucks also was necessary to bring in fine soil for shading and carrying away excess rock soil; extra loaders were required to assist in loading these trucks. When the work force was divided—some on mains, some on services—two backhoes with two operators were necessary. Union rules are that common laborers, pipe setters, or truck drivers cannot operate the heavier, special equipment. Only those workmen classified as equipment operators, or it necessary, a foreman who previously has been an operator can handle the backhoe, the heavy loaders, cranes, blades, and other heavy equipment, except trucks.

Tuesday's operations were in two general areas. The small backhoe was busy with a fairly large crew on four-inch service lines. These were placed on Golden Mantle, lower Deercliff, and a portion of Ray Drive, as the Deercliff and flay Drive mains were placed during the winter by another crew. There was some difficulty in locating the wye markers, but we managed.

The big Poclain backhoe worked all day between two manhole locations on Ponderosa Drive. This trench had to be deep, and wyed also, to accommodate both a fourteen-inch pressure, and a six-inch gravity main. A hundred and seventy feet of trench work plus partial excavation for one of the manholes was accomplished, but no pipe was laid on this date.

The residence owner of Lot 131 requested better location [of] his service line, and Erik Beyer spent some time looking over a possible change but had to get permission from the

chairman of the district board, whose Lot Number 122 on Ray Drive would have to be crossed to accommodate the change. Permission was granted.

Wednesday, May fifteenth, was a busy, nine and a half-hour day with twenty-four workmen, including the two foremen, on the job. One crew of small size attended to the four-inch service lines on Deercliff and Ray Drive, but was slowed somewhat by hard digging, the large crew succeeding in laying six-inch gravity line in the deep trench dug yesterday on Ponderosa Drive, after first very carefully hand-trimming and removing rock particles.

Backfill for shading and partial cover was very carefully placed and compacted under the watchful eyes of Carlos Archuleta. Again, extreme care had to be used in compacting in the deep trench. The fourteen-inch pressure line was laid on the compacted soil over the top of the six-inch gravity line. These heavy sections require use of a crane to lift and place them. Two cast-iron elbows had to [be] placed at Willow Drive and the intersection there with an easement with Ponderosa. This involved careful hand-excavation to secure solid granite backing and sufficient depth for placing concrete thrust blocks. The thrust blocks were poured in the afternoon, using five and a half sack mix with three-quarters-inch maximum size aggregate. There is quite a pressure in a right-angle turn, and if that angle is not thoroughly held in place, you get a chattering in the line. That is why your water pipes chatter sometimes when the plumber hasn't taken note of that.

Joe Krmptotic had personally supervised and assisted the laborers in pouring these blocks. Sacked sand was used as forms. The concrete was a fairly stiff mix and was well tamped. Now, I mentioned that sacked sand was used as forms: down in the bottom of

the trench where the forms will never be seen, sacked sand will serve the purpose. Of course, had you been doing that up on the surface where everyone would be seeing you, you would have to have wooden forms and everything smoothed off nicely. But that is not the case underground; you simply want it to do the job that it's intended to do, regardless of how it may look.

The two manholes were placed by ten-thirty A.M. The one at the deep part of the trench was ten and a half feet in height.

I might mention something here about construction of manholes. (I think I referred to it again.) But when you build a manhole—you're first building it—and if it's built within a roadway, you do not take the time after filling to carefully raise the manhole clear up to grade and put the metal cover on; it takes too much time to do it. So they're usually always buried under at least four or five or six, or maybe more, inches of soil than that, and the temporary pavement is put on until the whole entire system is about ready to be used. Then the crew comes along—or several crews—and raise those manholes very carefully by putting sections and covers on.

In late afternoon, the two lines, six-inch and fourteen-inch, were continued about seventy-five feet down the trench in the easement. The plans showed a wye in the southern corner of Lot 210 adjacent to the easement, but this location was in a rock and boulder patch. I told the foreman I would select a more suitable location tomorrow. It was necessary also to attach four-inch risers to all the wyes in the deep trench area. Now, that is done to bring the lateral carrying the four-inch service line over—if you started way down there at six and ten foot deep, you would have to build a very deep trench over to the lot line. This way, a riser is put up maybe as much as three to even five or six feet if necessary—a

riser made from a four-inch line— and the rest of the four-inch line is connected to that and dug at shallow depth over to the lot line.

Watering and compaction of fill in the deep trench was very carefully done under the supervision of Carlos Archuleta. Work on this deep trench area was well supervised, well done, and safely done—thanks to the two foremen, Joe and Carlos.

There was indication that rock trouble in the easement would show up in Thursday's work. On Thursday, work crews were cut down to twenty men. Erik Beyer apparently thought there was too much work for a single inspector with this large work force. He sent another inspector to help out. However, the main line crew had encountered so much rock that they were slowed down and did not require much watching. I was thus able to take care of the work without extra help.

Carlos took charge of the service line crews, and they made fair progress; but rock interfered with excavating for the line to Lot 84 on Deercliff. This crew completed service lines to six lots on upper Deercliff and one on Ray Way.

Arriving at the job site at seven-twenty A.M., I went to the easement between Ponderosa and Skyland where observation yesterday indicated rock trouble. The backhoe was already at work, but rock was encountered, and the going was tough. Not only was this area rocky, but inaccessible for some of the equipment on the surface. Little progress was made 'till afternoon. Drilling and blasting was necessary five times. When sufficient trench was opened to permit pipe laying, hand labor was necessary for shading, also for placing the initial one and a half feet of backfill. Nevertheless, by five o'clock, sixteen lengths each of six-[inch] gravity and fourteen-inch pressure lines had been laid and partly covered. Now the gravity line must be laid to

a grade which will allow flow. The pressure lines—you do not have to be so careful with them; they're under pressure, and the effluent is being forced uphill, so the grade is not so important. But you must leave at least a foot of compacted soil above the gravity line before the pressure line is placed.

The wye for Lot 210 on the easement that was placed by the designers in the rock area had to be moved about sixty feet to a diggable [laughing] spot. The water truck, broom crew, and premix patching crew were busy all day in areas where pipe laying was already completed.

Upon arrival at the job site on Friday, the big Poclain backhoe was attempting to continue down the easement, but the going was again tough. It was necessary to drill and blast boulders and solid rock. Only four lengths each of six-inch gravity and fourteen-inch pressure lines were laid by nine-thirty. I had some questions regarding placement of service lines and drive to Erik's office, but he was busy with inspector Vic Clyde and said he would be over my way later. By the time Erik arrived, the service crew had put in the first six four-inch services on Skyland Drive. Erik arrived at eleven-thirty, and we walked over several of the service areas; and he left it up to me to select points which might have to be changed.

One of the residents in the area contacted me during the noon hour and showed me where services should be located to Lots 36 and 37. Another resident also contacted me at noon and gave directions for placement of his service. Local people were thus very helpful with respect to locating services to the residences. Otherwise, we would have to make some pretty good guesses sometimes, and look at the roof to see where the vents were, and try to look through windows, and find which way the bathroom was placed.

Another delaying condition relative to the six-inch and fourteen-inch lines on the easement was handling of backfill. Excavation was so rocky that screening was necessary for the bottom one and a half foot of backfill. The balance of the trench could use the unscreened material. A Caterpillar loader on tracks rather than on rubber had to be used. Rough terrain and coarse material thus contributed to limiting laying of the mains to 104 feet of six-inch and 102 feet of fourteen-inch; one manhole was constructed at the junction.

Following are totals of pay items placed by Krmpotic and Archuleta crews this week: six-inch gravity main, 720 feet; fourteen-inch pressure main, 575 feet; four-inch service lines, 776-1/2 feet; three wyes, two manholes; three rodholes; and three fourteen-inch iron elbows. (The contractor bids these and the designers arrange so that the pay items are listed. He may get nothing at all for excavation of the trench. He must figure and guess how tough the trenches are going to be; and the pay items, being lengths of pipe and services and manholes and rodholes and things like that, prices will be up on those items to pay for his excavation. Therefore, you notice, there was nothing said about depth of trench or foot of trench—just pipe items.)

Weather during the work week of May twentieth to twentyfourth was partly cloudy and cool with one shower on the twenty-first. Crew size varied from fourteen to nineteen, and an extra backhoe, and on some days a crane and a power broom were added. At least one truck was present each day.

One crew was assigned to service lines on Monday, the twentieth, and this crew reported for work at six-thirty A.M. The crew working on the fourteen-inch pressure main and the six-inch gravity main started an hour later. The service crew placed six services on Ponderosa

and Skyland drives. The main crew had trouble for the first two and a half hours on account of presence of boulders but managed to lay 221 feet each of the fourteen-inch and the six-inch lines by the day's end. Fine sand for backfill had to be hauled in, as the material removed from the trench was just too rocky for shading and initial backfill. Manhole C-11-4 was completed, and seven wyes were placed.

Tuesday's work was all on the main line, and there was better than 270 feet of each size of pipe laid. Manhole C-10-1 was constructed and five wyes placed. Two trucks were at work hauling boulder fragments out, and fine sand for backfill in. Drilling of boulders slowed the work enough that I had time to set service markers for lots on Skyland Court. Erik Beyer came on the job in time to help me with the services. A rain shower started at four o'clock, but the workmen kept on the job 'till quitting time at five.

Wednesday, the twenty-second, was a slow day because of depth of trench and presence of solid rock requiring drilling. Laborers were put to work doing drilling and blading operations on Skyland Court and Skyland Drive, locating gas and water services, so they could be protected during blasting and excavation of sewer trench. A considerable amount of cleanup was also done by the labor crews. A hundred and seventeen feet each of the fourteen-inch pressure and six-inch gravity lines were completed in the deep trench and two wyes installed. Erik made two trips to the area on Wednesday to make sure the service locations would be in the right places, and to explain to me some requirements relating to his monthly report to the district officials.

On Thursday, May twenty-third, there were two sizes of gravity line to be laid. A new trench was started, in which was placed a large fifteen-inch gravity line which was

really a collector line leading to a pumping station. A hundred and eighty feet of this line was placed and backfilled. Also 141 feet of six-inch gravity and thirty-two feet of pressure line were placed, and two manholes were built. Two fourteen-inch iron elbows had to be placed at angle points in the fourteen-inch pressure line. This, of course, required concreting of thrust blocks, to prevent movement.

Two wyes were installed on the fifteen-inch line. These wyes, of course, were fifteen-inch to four—that is, on a six-inch line the wyes were, of course, with the six-inch by four. Each wye actually is a pipe length with the wye—with its opening—attached to that pipe. And, of course, the larger lines sometimes have to have wyes on them because they [will] be servicing lots nearby, even though they're collector lines, collecting effluent from six-inch to six-inch lines, for example. There were no service lines laid this date.

On Friday, the twenty-fourth, there was a thirty-seven and a half-foot section more of the fifteen-inch gravity line laid to within eight feet of the wet well from which the effluent would be pumped through the fourteen-inch pressure line to U.S. Highway 50, thence southerly to the treatment plant. About 140 feet of six-inch gravity line containing two wyes was laid also. Thirty-seven and a half feet of fourteen-inch pressure line was laid from an elbow southerly to the pump house, and manhole C-i was also built; it had a three-way base, and in order to accommodate a collector line from four residences, plus the flow from the six-inch main and the fifteen-inch exit line to the wet well—that made rather a complicated base. Sometimes, when you do not have a suitable base, you have to break into the concrete and prepare a hole—that often has to be sandbagged and concreted around the outside.

The fourteen-inch pressure line detoured the manhole, but for some distance, both the fifteen-inch gravity line and the fourteen-inch pressure line could be placed in the same trench. Hand labor was used in order to carefully prepare grade for the fifteen-inch gravity line, so good closure could be made with the aperture in the pump house.

Joe Krmpotic called a halt just before three o'clock. Pay item summary for the week shows the following: 915 feet of six-inch gravity main, 270-1/2 feet of fifteen-inch gravity main, 111-1/2 feet of four-inch service lines, 825 feet of fourteen-inch pressure line, eighteen wyes, two cast-iron elbows, and five manholes. There was no pay item for the concrete poured around the elbows; the cost of that is part of the laying of the pipe.

The following work week was limited to four days, and as far as accomplishment is concerned, it was the poorest for the crew I had been with. There was no work Monday, and Tuesday was a day of misfortunes. Joe Krmpotic (foreman) had just finished breakfast at the Carson City Nugget, when he fell to the floor, became pale, and complained of a chest pain. He was taken to a Reno hospital. This occurred about six o'clock. The report received later today stated that he was improving.

Carlos was in full charge of the crew, but this was really a bad-luck day. The Skyland Drive trench had to be blasted because of solid rock at shallow depth. About five hours of drilling and blasting was done before the Poclain backhoe could start work. The blasting ruptured an unmarked water pipe. This pipe must have been one that served the abandoned Boy Scout camp because more of the local residences were cut off from water. Repairs were made to this pipe and to a gas service which was also severed about five P.M. [laughs]. Gas was shut off at five-forty-five P.M. but no repairs made this date.

This same day at one-fifty-five P.M. Reuben, a laborer of Indian descent, suffered head injuries during blasting. He was standing in what was presumed to be safe distance from the blast, when he was struck on the helmet by a falling chunk of asphalt. The asphalt surfacing, of course, is present in these trenches, and some of it is not thrown far enough away from the initial trench but they often blast right—drill the hole right through. This asphalt chunk had been lifted very high, and it really probably didn't hurt Reuben; but Reuben became frightened, and he ran without noticing objects in his path. He fell against the brick pillar in the southwest corner of Lot 41. His head was injured severely, and he was bleeding profusely. An ambulance was called, and he was taken to the Tahoe-Carson hospital. I called on him at seven-thirty in the evening, but he was under medication, but recognized me. That really was a messy day!

I spent most of the day contacting residents along Skyland and setting markers for sewer lines. Erik arrived in late afternoon and assisted me in selecting service locations to Harrah's residences and gave me instructions relating to a format for reporting the month's work. (I referred to Harrah's as a residence, but later on I found it was called a "villa.") The only pay item for this day was twenty-nine feet of fifteen-inch gravity line.

The following day's work on the main line was again delayed by necessity to blast and remove solid rock in the lower four to eight feet of the deep trench. After the initial excavation of yesterday's blasting, only four lengths of fifteen-inch gravity line could be laid. Drilling and blasting was done all the rest of the day, without being able to prepare a finished grade line in the trench to lay the pipe.

Ed, the Poclain operator, was transferred to the small backhoe, and he started digging trenches on upper Skyland. He severed a gas

line which was repaired by the company in a relatively short time, fortunately. Ed managed to dig enough trenching to allow placement of four service lines.

Traffic on the south end of Skyland Drive was thick all day, partly because the Teichert company was hauling fill material for the Skyland pump station. (Teichert, of course, was the contractor for the pump stations.) The pump stations were being constructed quite rapidly. Al Palander, who was loaned to the district by the state Highway Department, was kept busy on inspection of the seven stations. Only fifty-two feet of fifteen-inch gravity main and eighty-three feet of the four-inch service lines were laid.

Joe Krmpotic was back on the job Thursday, believe it or not! I arrived at six-thirty just in time to see the backhoe rupture a water pipe on his first bite into the trench. This service line had not been marked by the water company. Water was a problem for a while until the proper shutoff valve was found. Carlos repaired the pipe later in the day.

The trench for service to Lot 217 was loaded with boulders, and blasting was required. After Ed had worked the small backhoe 'till two o'clock, he was transferred to the Poclain and started digging in the main trench. Four service lines were placed in the trench he had just dug and backfilled, but because of rocky trench, only sixteen feet of the fifteen-inch pipe could be laid. Rock fragments were removed from part of the blasted area, but more blasting will be required before proper depth can be obtained.

Friday, the work crews were still faced with the rock problem and also with nested boulders. This progress was again very slow. Seventy-eight feet of fifteen-inch line was placed in the deep trench with two wyes for the fifteeninch line. Three four-inch service lines were finished.

Erik Beyer came to the job in the afternoon and gave Joe Krmpotic and Carlos the news that the grounds in the vicinity of Harrah's residential quarters would have to be cleared of the contractor's boulder fragments and other debris because of the ladies' golf tournament [that was] about to begin. Presumably, some of these people would be staying at Harrah's.

Summary of the pay items for this four-day long, worst-of-all work week was less than most normal daily reports. A hundred and seventy-five feet of fifteen-inch gravity line, 215 feet of four-inch service lines, and four wyes constituted the total [laughing].

I had car trouble Monday, [June] third, and Erik and one of the inspectors watched my crew. But I believe that the pay items were included with those shown on the June fourth report just stated. Trouble with rock and boulders in the deep trench on Skyland Drive had continued.

Tuesday, the fourteen-foot deep manhole, U-25-3, was finished; and ten more lengths of fifteen-inch gravity line were laid, and a twenty-one-foot lateral to Lot 28 in Skyland Court was laid. Erik Beyer arrived in the afternoon and showed me what to do at Harrah's to complete that area.

Considerable water was used with the imported silty sand in shading and partial fill of the deep trench, but compaction was good. Since the trench was wide as well as deep, there was not much danger in cave-ins while compacting. Traffic was a problem, however, due to the ladies' golf crowd, going to and coming from Harrah's villa.

On Wednesday, June fifth, two crews were at work, but going was slow on the fifteen-inch gravity line due to encountering of occasional large boulders which had to be drilled and blasted. The two pipe layers alternated between the fifteen-inch line and four-inch service line; they would go from place to

place, whichever trench happened to be ready. Progress was hampered also by necessity to haul backfill in and boulders out of the area over a circuitous route. One unmarked water service was broken, but quickly repaired by Carlos Archuleta. Almost all these spring working days were nine or ten hours. Time and a half was paid for the one or two hours' overtime. This was done for the inspectors as well as for the contractor's crew.

Thursday, June sixth, completed all mains and connections, also services on Skyland Court. Also completed were all the main lines and service lines except those for Lots 218 and 34 on Skyland Drive north of manhole U-25. Due to much better conditions, such as less rock and boulders and shallower trench and more working room for equipment—all of this served to make considerably better progress. Utility people representing gas, telephone, water, and TV cable were present most of the day and aiding in locating their lines, especially in the Harrah's villa area, where all utilities were underground. Erik Beyer spent considerable time in this area to help in securing accurate information for properly locating the wyes and service lines. There was talk among workmen about a general strike around June seventeenth. All work on June sixth and seventh was on Skyland Drive.

On Friday, June seventh, 289 feet of fifteen-inch gravity line, and seven wyes, and one manhole were completed. The grade setter working for the contractor these last few days was an apprentice only. His name was Gary Forsberg, and he was very conscientious about his settings and his measurements from the string line.

Summary of the week's items included a total of 758 feet of fifteen-inch gravity line; ninety-nine feet of service lines (which, of course, were four-inch lines); and one four-inch riser; twelve wyes, which were all

fifteen-by-fours (that is, four-inch wyes and fifteen-inch pipe); three manholes; and a seven-foot connection of a six-foot gravity line to a manhole.

The week of June tenth to seventeenth was warm and partly cloudy. Crew size was sixteen members all days except Wednesday and Thursday, when one and two extras, respectively, were added. Equipment was about the same as last week, except not as many trucks were used. Best day for production of pay items was Monday, the tenth. Work progress was rapid due to shallow trench; 568 lineal feet of fifteen-inch line was laid. Blasting was required only once to break up a large boulder. Shading, backfill, and compacting kept up with the pipe laying.

Backfill for compacting was relatively free of rock particles, but considerable water was required to get optimum compaction. Several gas and water lines were encountered, but fortunately none were broken. Thirteen fifteen-by-four-inch wyes were installed in the line, and one six-foot deep manhole was installed. There were quite a number of spectators, both young and old, this date.

On Tuesday, presence of boulders requiring blasting, and presence of gas and water lines in the boulder area retarded rate of progress. Much handwork was necessary to avoid injuring these lines. Because of slowdown on the main line, a two-man crew, one with the small backhoe, were sent to dig trenches for sewer lines; two of such trenches with four-inch pipe service lines were finished. Erik Beyer with his young son was present in the morning, and Erik helped set six locations for service lines. I appreciated this help because I was busy with troublesome boulders and utility lines.

Wednesday, June twelfth, Joe Krmpotic stayed with the main line crew, and Carlos took charge of the service crew after spending

the first two hours on the main line. Again, there was talk of labor going on strike next week, but no definite time set. Erik Beyer came on the job for a short time, but we needed no more service markers at that particular time. Progress was very slow because of solid rock and boulder nests on main line. Only eighty-one feet of fifteen-inch line could be laid. Carlos's crew completed six service lines, and Joe's crew finished manhole U-26-3, a seven-footer.

Thursday, June fifteenth, was another real slow day. Work on the main fifteen-inch line was both tedious and discouraging for two reasons: first, the designers failed to correctly allow for height—or extra diameters, really—of the fifteen-inch pipe. I don't know what they did, unless they just figured fifteen inches instead of adding the two inch and a half thicknesses of walls up and down. Correction had to be made in trench depths to insure gravity flow. The other reason for delay, of course, was due to presence of rocks and boulders.

Joe's main line crew laid only thirty feet of fifteen-inch line. Carlos's service crew managed to place 154 feet of service lines to six lots. One water pipe was broken and repaired.

On Friday, the fourteenth, the loaders and all small equipment were moved before four o'clock to the contractor's headquarters at Round Hill. This was done because the work might be delayed by the strike next week. The only pay item this date was two hundred feet of four-inch lateral service lines to eight lots. Lot 218 at the extreme south end of Skyland Drive was presumed to be solid rock; therefore, the big Poclain hoe was assigned to this service trench. It was found that the semisolid rock was a soft granitic material, and the big hoe managed to complete excavation without need for blasting.

The water pipe broken Thursday and repaired had apparently caused sand to fill the pipes on Lot Number 26 (which is the Frank Perez property). Joe, Carlos, and crew left the job site by four-thirty, and left me to arrange for a plumber to take care of the Perez water pipes. Totals of pay items for the week were the following: 893 feet of fifteen-inch gravity line; 526 feet of four-inch service lines; nineteen wyes, which were fifteen-inch by four-inch size; and three manholes.

During weekend I was informed that work would resume Monday, the seventeenth, as there would be no strike. I believe it was Erik who called up on Sunday after he had found out about it.

I arrived at the job site on Monday about six-thirty and found both backhoes in trouble with rock. The main trench was expected to be this way, but it was also found that service trenches also were quite rocky. Only twenty-nine feet of fifteen-inch line and fifty-three feet of service lines were laid this date. Joe Krmpotic said that he would keep the big drill in the trenches all day tomorrow and would not try to excavate until the drill works and blasting had covered the area at least once.

Sixteen men were on the crew today, and the same number would continue on Tuesday. Tuesday's pay item was forty-two feet of fifteen-inch gravity line. There were no other items, although working hours were six-thirty until four-thirty for all the crew except drillers, who worked from seven-thirty A.M. 'till seven o'clock P.M.

Rock was encountered wherever excavation was attempted. All five lateral branches for the four-inch service lines had rock in the trenches. The smaller backhoe, assigned to the lateral trenches, also developed an oil leak; and work was shut down on the laterals.

Trouble seems to come in bunches. The big backhoe also broke down before noon; thus it would be unable to continue this date. It had broken two belts on the hydraulic compressor.

Forty-two feet of fifteen-inch line was laid on Myron Drive. I set service locations on Myron Drive and made a couple of trips to the office. Erik came to the job site and approved the service locations. The crew on the main line left at four-thirty, but the drillers stayed on 'till seven.

On Tuesday, June nineteenth, I found three foremen and eighteen workmen on the Skyland project. Joe and Carlos had the large crew on Myron, and Martin Rosso had the smaller crew on laterals in the vicinity of [Harrah's] villa. Martin's crew worked all day, but laid no four-inch laterals due to extremely bad rock problems. Only one trench was almost ready for pipe by the day's end.

Joe and Carlos's crew on the other area made almost a record for pay items in one workday. They had laid 663 feet of the large sixteen-inch gravity line and a fifteen-foot stub of six-inch line from the south leg of Myron Drive to a manhole. They also completed service lines, twelve in all, from Lot 69 to Number 80, inclusive. They did this in spite of severing an unmarked water service, and drilling and blasting in one place. At the request of David Romner, owner of the residence on Lot 77, I changed location of a service lateral by moving it uphill to a point which would connect with a sewer line he had already dug from his house to the property line. This was an extra busy day for me.

On Thursday, June twentieth, there were three crews on the Skyland subdivision, and I had all three to cover. Joe had the main line, with the digging crew and pipe laying, but made slow progress due to blasting of solid rock and boulders. His crew laid only seventy-

one foot of fifteen-inch gravity line and placed only four wyes.

Martin Rosso, still on services, also made poor progress by reason of trenching in boulder patches. His crew laid only three lateral services, totaling seventy-six feet.

Carlos had the backfill and compaction crew finishing the trenches on the northeast end of Myron. The plan for Friday was to set the entire crew—or crews—on the services, including trenching, laying four-inch pipe, and doing all the backfilling.

On Friday, the twenty-first, I arrived on the job at seven-twenty A.M. and found [Martin] Rosso's crew on backfill and trenching service lines opposite and above Harrah's villa. Since the big Poclain hoe was not yet completely repaired, there were only the two smaller backhoes at work, and they could not handle the tough rock work as expeditiously as could the big fellow.

Joe and Carlos had their men in the seine general area where [Martin's] crew was working, but rock, boulders, deep trench, and surprisingly heavy traffic on the local roads were all slowing progress. Only sixty feet of four-inch laterals could be laid, and Joe's attempt to lay more fifteen-inch pipe was limited to two thirteen-foot sections and a three-foot stub. Totals of pay items for the week were 834 of fifteen-inch gravity line; 189 feet of four-inch service laterals; fourteen wyes, size fifteen-inch by four-inch; two manholes; and a fifteen-inch stub of six-inch gravity line.

Monday, June twenty-fourth, work was started with the sixteen men, including the two foremen, Joe and Carlos. Carlos started one crew on Myron Drive and another on services off Skyland Drive. Joe Krmpotic -had the -largest crew on the main fifteen-inch line. The crew on the Myron Drive with the small Case backhoe finished only one trench, then

was called to Kingsbury grade for special work under another foreman.

Carlos's other crew on Skyland Drive services had some trouble with the rock. Three of these services on the north side had to be four-inch pressure lines, as pumping would be required to force the effluent uphill from certain lots. These pressure lines have much thicker walls than do the gravity lines. (By the way, in addition to the seven large pumping plants, there were as many on the whole project as thirteen, I believe—small pumping lines, without being particularly housed to take care of these special cases where lots had to be served by pumping.)

Trouble with rock slowed progress again on the main line, but 120 feet of fifteen-inch pipe was laid and backfilled. Joe Krmpotic asked me in the afternoon about what the surveyor who appeared was supposed to do. I found that he had been ordered by someone to place the manhole on Myron Court nearer to the end of the line. I called Erik, and he had the surveyor go ahead with the new location for the manhole, which afforded better elevation for entrance of the six-inch gravity line.

Tuesday, the twenty-fifth, two crews were at work. Joe had the big Poclain, which now was fully repaired, and the two pipe layers and the grade setter, plus three of the laborers, on the fifteen-inch main line. This crew laid sixty-four feet on Skyland to manhole 26-4, and seventy-two feet on the easement from manhole 28-1 on U.S. 50, to manhole U-27-2 and a six-inch stub to the manhole on the north. This crew built two manholes.

Carlos's crew had rock and boulder trouble, but managed to place four services on Skyland Drive. Erik came to the job site and discussed change on Myron Drive and other adjustments to be made by moving manholes out of boulder patches. I was contacted in late

afternoon by residents concerning repaving the streets. I told them this matter would be taken up with Erik and Leo Tuccori, the contractor's manager.

Good progress was made on Wednesday, the twenty-sixth. Both the service laterals crew and the crew on the six-inch gravity main, which was laid from manhole C-3-1 to manhole C-3-2, and from C-3-1 also to manhole U-26-4 on U.S. 50—a total of 259 feet. Also five wyes were placed. Service lines totaling 225 feet were joined from the main line wyes to ten different lots on Myron Drive.

Thursday's work was all on services. Five lots on the northern portion of Myron Drive were connected to main line wyes with a total of ninety-five feet of four-inch line. Five Skyland Drive lots also had service lines completed, amounting to a total length of ninety-eight feet.

Friday, June twenty-eighth, Carlos Archuleta was in full charge as foreman, as Joe Krmpotic was absent. Three four-inch service lines were placed to lots on Myron Court, two of them being pressure lines on account of having to force effluent upgrade. This work was finished by nine-thirty A.M., as portions of the trenches had been dug previously.

Carlos then left one of the workmen in charge of the backfill on Myron Court, with a loader operator and another laborer. The others accompanied Carlos to the easement which ran from manhole 0-10-1, easterly. The backfill crew on Myron Court did very well with backfill and was finished by eleven A.M. All hands worked until quite late on the easement. Work there was limited to sixty-two feet of six-inch gravity line and one wye for Lot Number 40. Slow progress was due to a broken water line which was not fully repaired. It was necessary to use a lot of hand labor due to unmarked water lines.

The water company man failed to show until late in the afternoon, although he had promised to be on the job in the morning. The gas company representative was on hand, and one of the women property owners was helpful in locating some of the utility lines. The upper end of this easement project had some unusual questions as to location. Erik was called to the job site and brought one of the design engineers along, and they tentatively decided upon the correct location. However, after they had left, the owner of Lot Number 36 showed me his east boundary, which was approximately thirty-five to forty feet east of his north-south fence. This put a different picture on the whole problem. I did not get away from the job site 'till nearly six o'clock.

I notified Erik Saturday afternoon, and we arranged to meet there early Monday. I also called a plumber to get the water line on Lot 39 completely repaired. Summary of pay items for this week included 321 feet of six-inch and 262 feet of fifteen-inch gravity mains, 675 feet of four-inch service lines, 134 feet of four-inch pressure service lines, ten wyes, and four manholes. Remaining parts of the Skyland subdivision lines, particularly those on easements, would be placed later under Victor Clyde's inspection.

Monday, July first, Krmpotic and Archuleta's crews would resume work on the Schoolhouse Road where we left off last winter. Three working days, July one, two, and three [1974] were used by the contractor this week on account of the Fourth of July holiday. The work was confined to the Schoolhouse Road. The easement trench on Skyland, which was started June twenty-eighth, would not be completed until property matters are settled. Trenching was easy, there were no rock or boulders, and depth of trench was shallow. The principal gravity main from United States

Highway 50 to manhole B-51-2 was an eight-inch line. This day's work included 653 feet of the eight-inch main to manhole mentioned, and from that point, easterly, to manhole B-51-3. The main was reduced to six inches, and 416 feet plus eight feet of six-inch lateral to the grade school made a total of 424 feet. One wye off the eight-inch line was placed to serve the grade school, three markers were built, and enough risers and grade rings were placed on the cones to bring the metal covers of the manholes to permanent position at the surface. A change in location of the wye serving the grade school had to be made due to presence of a steel pipe leading to a leach field. This pipe would have to continue in a service until the entire new sewer system could be in operation.

Designers had placed manhole B-51-1 directly beside the anchor block for a light standard. I moved the manhole twenty-six and a half feet easterly.

This first day of July was a productive work day with a crew of twelve men, and two Michigan loaders, one Poclair backhoe, and a small drill, the latter on standby.

On Tuesday, July second, the planned distances between manholes B-51-4 and B-51-2 was much longer than the actual measured distances. This probably was because the line was shortened by moving it, as we had done, beyond the paving and into the shoulder on the inside of a principal curve.

Summary of pay items will be shown on July third, along with items placed that date. Progress was good again on the second, but one large boulder had to be drilled and blasted. There was also delay in the backfill and compaction. The fire hose we had been using would not reach the middle of the section of the day's work from either hydrant at the grade school or high school. A water truck was obtained after quite a delay. All pipe

laying this date was six-inch gravity main. Manholes, B-51-4 and B-52-1, constructed. Work finished on the school road by noon on July third, and the crew moved to U.S. 50 at the firehouse and county building.

In the meantime, I had contacted all people concerned about location of wyes in front of the two main buildings that is, the buildings in the vicinity of the firehouse. Erik went over the project and was satisfied with location of wyes, except that he thought there might be interference with the firehouse because the gas tank position would interfere with the direct line from the present septic tank. Later in the day, I contacted the county building inspector, who stated the gas tank was parallel to the firehouse and close to it; thus the wye connection could be installed directly below the septic tank for the entire 324 feet of the line. This line with all the wyes installed was finished by four-thirty P.M. There were three wyes serving the firehouse, county office, and the area adjacent to manhole B-50-2. Manholes B-50-2 and B-52-2 were also installed this date, as was a 190-foot line, which finished the Schoolhouse Road section.

Yesterday's work included construction of two manholes, B-51-4 and B-52-1, and all the six-inch gravity main from manhole B-51-3 to B-51-4, thence to B-52-1 and to a point beyond. The total length was better than six hundred feet.

The following week's work took place in the two Zephyr Heights-Zephyr Knolls area[s] on the easterly side of highway U.S. 50 and above Zephyr Cove. On Monday, July eighth, better than three hundred feet of six-inch gravity line was laid; and four wyes, two rodholes, and one manhole were placed on the Lakeview Circle easement. This easement was on a slope, and Erik Beyer arrived in the afternoon and requested that laying the

pipe in the trench should start at the bottom and proceed uphill. Joe Krmpotic, the boss, said, however, that the responsibility was his and the pipe between rodhole H-31-2 and manhole B-31 was laid from the high to the low area. I'm just wondering if Joe wasn't contrary on that because he didn't like the appearance [chuckling]. All of the areas were laid from low to high elevations, which this other one should have been done in the first place! [Laughs]

Erik also requested that trees which had to be removed in trenching on the easement be disposed of as soon as possible to avoid local observers' criticisms. All trees felled this date were thus removed from the area. No water pipes were encountered in the trench. At the end of the shift, Erik and I checked the slope of an area on the east side of U.S. 50 north of Skyland where the owner claimed the slope was too steep to construct an approach road.

Showers occurred occasionally on Monday, but on Tuesday, the ninth, the job had to be shut down at one o'clock on account of the extra heavy rain. Workmen had been wet and cold; so was the inspector.

Erik Beyer was on the job about eleven o'clock and commented about the lack of short lengths of pipe. Practically all the lengths were of the standard length. We were told they said they were not obtainable at the present time. I visited Vic Clyde's job on the Skyland easement at noon and showed him location of wyes where his crew was working.

On Wednesday, July tenth, I had car trouble and left the job at eleven-thirty. Vic Clyde and Erik watched the afternoon's work because I was unable to return from Carson City. They took measurements and counts of finished pay items, and I included them in my report of Thursday, July eleventh.

The work was on the two Lakeview Circle easements, and by eleven o'clock all the six-

inch line had been laid on the southerly easement. I was told that three hours' additional work was necessary to fill, water, and compact the backfill, and make cleanup.

Thursday, the work continued on the Lakeview easements, and at Erik's request an extra wye was placed in the six-inch main to serve Lot 8-A. This lot was vacant. The we already placed was opposite the upper part of the lot, but Erik's thinking was that it would be cheaper for the builder to place his residence at a lower, already partly cleared and excavated area. This was the thinking.

A further explanation should be made about placement of wyes. The wyes are affixed as an integral part of a regular section length of the main line, and are located so they can best serve the residence already on the lot. A four-inch service line must be placed by the contractor from the we—the main—to the property line where it is kept until owner makes his house connection. On vacant lots the we location is pretty much a good guess. The open we is sealed with a cap which keeps backfill dirt from entering the main. Of course, the wye's position is marked over on the property line usually by a surveyor's stake with some paint on it. When the lateral service line's put in by the service line crew, it is, of course, joined to the wye after removing the cap. In case the wye is not used, the cap is left on permanently.

On Friday, July twelfth, I spent the work period on foot, as my car was in the garage for repairs. I was delivered to and from the job by Vic Clyde, who lived about five blocks from me in Carson City. (Vic, by the way, was one of my students when I was teaching in high school, and he was one of the students—two that I remember—who'd never missed a single question on an examination [laughing]!)

I spent the first three hours in placing markers for service lines on part of Lakeview

Drive and on the easement above manhole B-13-6. I was assisted in this by one of the owners of several of the lots to be served, and I appreciated his assistance. By eleven o'clock the crew had finished a manhole, and the big backhoe could start work where it had been necessary to drill and blast boulders below Martin Drive. Some of the laborers were busy laying rock riprap on the steep slope bank above U.S. 50.

Work progressed fairly well on Jerry Drive, but a twelve-inch corrugated metal pipe leading from a drop inlet at the top of the grade encountered in the trench was severed. The sewer trench had to be redug a few feet to the north to avoid this pipe, which was almost parallel and at the same depth. The break in the pipe was repaired by placing a five and a half-foot section of pipe. Erik was on the job for a while in the afternoon and reviewed the location for service lines.

The week's pay items showed the following: 1,406 feet of six-inch gravity main; eighty-five feet of four-inch service lines; fourteen wyes; three manholes; and three rodholes. (I think everyone is familiar with a rodhole. A rodhole is usually at a terminal point of the sewer line and is used as an access for cleaning or running a clean-out rod down through the line.) Another special pay item was ninety-three and a half square feet of rock riprap placed for protection of the cut face above U.S. 50.

I continued riding to and from work with Vic Clyde until Wednesday, July seventeenth, when I could use my repaired Dodge car. In describing these portions of the Round Hill to Glenbrook sewer construction operations and crews, to whom I was assigned as the inspector, I have done so quite in detail, covering the first eight and a half months, November, 1973 to the middle of July, 1974. Actual construction work of these same crews

continued in much the same fashion, as did my inspection methods, until completion of the project in early January [1975]. I believe, however, that I have gone into sufficient coverage of this eight and a half month period to familiarize future researchers who may study these records (say five hundred years from now), including the construction methods, the supervision, the construction equipment powered and lubricated by petroleum products, kinds of material of which the pipelines were made, classification of personnel doing the work, geographical and geological problems, as well as some of the human relations problems with property owners—all of which are encountered in this kind of twentieth-century construction project.

Now, let's see here. I will attempt to shorten some of the descriptions of details of the last five and a half months of this construction project, and I may group the time features into one- or two-week intervals rather than making descriptions by the day. All of the sewer mains in the Zephyr Heights/Zephyr Knolls areas were six inches in diameter, and these mains flow by gravity under U.S. Highway 50 to one of the pumping stations near the lakeshore. From there it is pumped up into the fifteen-inch pressure line and delivered to the Kingsbury treatment plant.

Due to repairs to my Dodge car, it was necessary for me to ride to the job site and back with Vic Clyde for several days. It was somewhat inconvenient to be without a car to travel back and forth in the work areas, but sometimes I could ride with Joe Krmpotic.

On Monday, July fifteenth, the presence of a maze of underground pipelines and conduits caused delay in attempts to avoid breakage. Three telephone conduits, a two-inch gas main, and a water main were under the road surface. Exact location of the water

main was unknown to all parties concerned, including the water company owner, Mr. Hall [laughs]. The line was broken and gushed water for four hours before anyone could locate the proper shut-off valve. The crew could manage less than two hundred feet of pipe laying, but did construct manhole B-13-I, and place one we.

The following day, July sixteenth, was without problems, and the crew laid better than five hundred feet of six-inch main, built two manholes, and inserted three wyes in the line.

Wednesday, July seventeenth, was another day fraught with broken water pipes, which not even a detector could locate in advance. Complaints were numerous from residents whose water was cut off while repairs were made. The crew laid only 270 feet of six-inch main but did place a rodhole and constructed one manhole.

I had my car again on the eighteenth. This date showed more progress than usual. Three manholes were constructed, two of them requiring poured base blocks. Four hundred and forty-two feet of six-inch line and four wyes and one rodhole were placed. Except for twenty-eight feet of six-inch line laid along U.S. 50, all the work was on Lakeview Drive.

On Friday, the nineteenth, some work was on easements. But the principal work was on Don Drive and Lakeview. An old wooden water line, said to have been placed about 1923, was intercepted. It was bound by steel bands. I selected a section I could lift for presentation to the museum in Carson City; and historical description should be obtained, but this task would be a job for the museum historian.

Nearly five hundred feet of six-inch line was laid this date. We had to call in a survey crew (which was swinging through the district) to relocate destroyed lot markers

before we could affix wyes in the line. Mr. Hall, owner of the water line in the Zephyr Heights-Zephyr Knolls areas, was present most of the day and many others to follow. He did not know exact locations of any of the water mains or services. He was continually making notes, which I assumed would prepare a map of his water system—something that should have been done when it was originally installed. However, he soon began making threats to sue the Helms Construction Company and the district for intercepting his wandering pipeline in so many places. I think this idea was to get an entirely new line put in by the Helms company—if he could win the lawsuit. Actually, every severance was expertly repaired by Carlos Archuleta, and was tested for leaks. I watched this repair procedure very carefully and made copious notes. After the job was completed in January [1975], I prepared a detailed statement regarding conditions and wandering location of these water mains, and I included my record of breaks and repairs. I did this on my own time after the job was finished and furnished a complete report to the district office for use in rebuttal if charges might be taken to court by Mr. Hall. I think Mr. Hall was cognizant of my detailed attention to the repairs of broken water lines. At the time of this notation in March 1977, more than three years have passed; and to the best of my knowledge, there has been no suit brought by Mr. Hall.

During week of July twenty-second to twenty-sixth a survey crew was needed in several places due to removal of identification stakes and obliteration of paint markers on the pavement. Arthur Roe, owner of Lots 7, 8, 9, and 10 on Don Drive, requested a six-by-six wye be placed on Lot Number 8 for serving a condominium which he proposed to build. He was told he would have to pay the extra cost, to which he agreed.

An occasional gas service and many old water services were severed, and repair, plus occasional boulder blasting, delayed progress. Nevertheless, during the five work days of this week, twenty-one hundred feet of six-inch line, sixteen wyes, eight manholes, one rodhole were completed on Jerry Drive, Marge Circle, and Don Drive.

One of the old water services broken this week was made of plastic pipe, buried only five inches below the surface. I don't know who could get service from it in the wintertime if the snow wasn't deep enough to prevent freezing.

This week of July twenty-ninth to August second was spent on portions of Don Drive, South Martin, Alma Way, and Stanley Circle. Almost sixteen hundred feet of six-inch line was laid; and twenty-five wyes were placed and eleven manholes built, two of which were approximately ten feet deep. Trouble was encountered in Stanley Circle, as the designed area for the sewer line was found to be almost totally occupied by a water main. Adjustment was made by moving the sewer trench to one side. The proposed sewer trench, in a paved road or court, has the pavement always cut ahead of them by a cutting machine; it's usually cut of sufficient width for smooth trenching. When a line is moved in absence of a pavement cutter, an unsightly jagged mess is made of the newly opened area. In this case, nearly five feet of the paving was destroyed—that is, five feet in width. Thus considerable extra work would be required in repaving.

Two metal water lines were broken and repaired this troublesome weekday of July twenty-ninth. The following day was without water line breakage, as a metal detector was employed to locate the metal water pipes. A plastic gas line was severed, and repairs were made by the gas company. [Laughs]

On Wednesday, July thirty-first, most of the time and effort were consumed in constructing three manholes on Alma Way, one of which was about ten feet in depth; and in addition, something less than 150 feet of six-inch line was laid.

On August first, there was deep trench work on Alma Way in granitic formation which was solid enough to withstand caving. Thus it was not necessary to have project personnel excavate an extra wye trench or to use wooden sheeting to prevent caving. Indications of the depth of the trench there is shown by the depth of manhole B-14-3, which was fourteen and a half feet.

Erik Beyer usually made at least one appearance each day, at which time he aided me in setting in advance of construction, locations along property lines for entrance of the four-inch service lines from the main. These markers also enabled the contractor to place wyes in the proper places on the six-inch main. Always, this wye would be placed in such position [that] there would be perfect drainage from the property line.

Work on August second was divided between Alma Way and South Martin Drive. Considerable time was lost due to interference of a water main wandering through the middle of a curved portion of Alma Way, thus requiring skip digging to secure satisfactory alignment and correct grade for the sewer main.

The backhoe moved to South Martin Drive just before noon and excavated for manhole B-29-2. It was necessary to move the location eight feet easterly to avoid gas and water lines, so that a wye could be placed in the proper position to serve the adjacent lot. It might be noted here that these numerous changes, made necessary by conditions not known to the designers, required that the plans in possession of each inspector had

to [be] modified by sketches and notes to show the “as built” condition. Thus future examiners of these “as built” plans are assured they are correct.

Three manholes, all of shallow depth, were constructed this date; and about 340 feet of six-inch main was laid. The week’s work was very satisfactory weatherwise, as all days were clear with some breeze, and at the elevation of Lake Tahoe seldom can summer temperatures go higher than the low nineties.

During the next two five-working-day weeks, ending August sixteenth, the weather was mild with mostly clear skies. About equal time was spent on four service lines and the six-inch main. There was only one day out of the ten when only the six-inch main was laid. On all of the nine days, the crew was split, one on the six-inch main and the other on the four-inch service lines.

During the second week, we had three foremen when Martin Rosso was added, also with three and sometimes four extra men. Carlos took the service line crew the first week, and he acted as one of the pipe layers in addition to supervising the crew. Another crew member acted as the second pipe layer. The total number of employees on my crews the second week consisted of three foremen, four pipe layers, four—sometimes five—operating engineers, one powderman on days when blasting was required, and six or seven laborers. Production during the two weeks was fairly good, but it kept me on the run. Three thousand, two hundred eighty feet of six-inch main, and 545 feet of four-inch service lines were laid. Thirty-two wyes, twelve manholes, and one rodhole were placed.

The usual problems with broken water lines and other common troubles were about average for this area. The big Poclain backhoe stayed on the main line work, and a smaller

Case hoe was used in the service trenches. Erik Beyer was good about helping set the service line markers at property lines for four-inch line entrances in advance of each day’s work. Some days he had to do this job alone, as I was plenty busy with two crews. Victor Clyde was inspecting another crew which was at work nearby, and one day he watched my service line crew for a few hours while his crew was stalled by rock and boulder trouble.

Ten sheets of the plans covered this ten days’ work, but that does not mean there was a different sheet for each day. The six-inch main crew’s work might be covered on the sheet B-1a, while the service line crew was working from sheet B-19. Streets on which work was done during the ten-day period were South Martin, Lakeview Drive, Jerry Drive, Marge Circle, Lookout Road, Don Drive, and Point Road. This does not mean that all these sewer lines were placed in those roads, but those were the roads on which these various crews were working—some of them were almost finished, some were not quite finished, and some were barely started.

On the sixth, there was delay caused by a veritable network of water services and gas lines. The metal pipes could be found by the special detector, but a three-inch plastic line was severed, and repair could not be finished ’till five o’clock.

On the seventh, after discussing the matter with the residents on Lot Number 2, which was Jerry Drive, a change had to be made in the sewer line. Plans showed it coming off an easement, but designers had been misinformed, and the service had to be placed from a street.

On Friday, the ninth, I had to leave my crews for about three quarters of an hour to answer an inquiry by a prospective house builder on Willow Drive in Lakeridge subdivision. He needed information relating

to depth of the service line at the property line, so he could secure good flow from' his residence and sewer outlets.

Martin Rosso joined us on Monday, August twelfth, with two extra men. He took charge of the crew after adding the small backhoe and an extra man from Joe's and Carlos's crew. Joe and Carlos worked the rest of the week on the six-inch main line. Since Rosso was confronted with a considerable amount of hand-digging in tight places, Joe let him have one more man. Both crews were bothered by rock requiring drilling and blasting, and were further delayed by breaks in the water main and gas line.

On Wednesday, the fourteenth, a six-by-six wye and six-inch lateral was placed for Lot Number 32 on South Martin. This was the result of a deal apparently made between Leo Tuccori, the contractor's superintendent. Since this was done without notifying Erik Beyer or me in advance, Erik and I would allow payment for only the four-inch wye and four-inch service line as shown on the plans. Any additional payment would have to be taken care of by the contractor.

Deadmen, to hold a retaining wall in place, were encountered. (The term deadman refers to a device, usually a large stone or boulder, or a heavy piece of metal, with a cable around it, which is fastened to the wall or other object to hold the latter in place. The deadman is, of course, buried with soil, a cover well compacted to prevent movement. In other words, if a wall is built against a bank which has a tendency to slough and would tend to tip the wall over, deadmen are placed up high with a cable attached to the wall to prevent this being done.) After laying pipelines, backfill had to be compacted thoroughly to insure no movement of the deadmen.

Erik Beyer placed all the service locations for the work this week without help from me,

as I was too busy with two crews. Vic Clyde gave me a hand on Friday afternoon, as his crew was slowed by extensive rock work.

The next two weeks, August nineteenth through Friday, August thirtieth, included both main six-inch line and four-inch service lines. The work was still on the Zephyr Heights Zephyr Knolls area, and portions of five streets were covered. These streets were North Martin, South Martin, Zephyr Heights, Lookout Point, and Inspiration Drive.

Vic Clyde was in some of the same areas. His crew was working on services. There were three days, August twentieth, twenty-ninth, and thirtieth, when Vic took over the service line crews that I had been watching. He kept the pay item records for these three days.

The total pay items I accounted for in these ten working days appears to be a sort of record, especially with respect to the six-inch line. These quantities were as follows: six-inch main, 4,597-1/2 feet; wyes, forty-three; manholes, fifteen; rodholes, four; four-inch service lines, 616 feet— and this does not include a three-day footage which was laid under Vic Clyde's inspection.

During week of August nineteenth to twenty-third, Joe and Carlos's crew placed six-inch main on North Martin Drive on Zephyr Heights Road. Martin Rosso's service line crew worked on the same two roads and on Lookout Road, Don Drive and Point Road.

On the nineteenth, the Poclain hoe had trouble sliding on a steep grade, as it had poor brakes. The usual trouble with breaking water mains kept a repair crew busy. These repairs usually were made by Carlos and a helper. Gas lines were severed several times, but the gas company made all repairs there.

Extra good progress was made by the main line crew on Thursday, August twenty-second. On this date, 918 feet of six-inch pipe were laid, three manholes constructed, and

six wyes placed. The service line crew under Martin Rosso was able to lay only eighty-seven feet of four-inch line to Lots 1, 2, 3, and 4 on South Martin Drive.

On Friday, the twenty-third, both crews had trouble. Martin Rosso's crew had to do a lot of extra hand-digging on account of presence of two gas mains. The main line crew was slowed by repeated breaks of the wandering plastic threeand two-inch water mains.

Water line position was also responsible for necessity to move a manhole fourteen feet from where shown on plans. Also, a new valve had to be placed as a safety measure where the water company had neglected to do so at the point of connection of a plastic line with a metal line. Actually, the water line trouble in this general area was almost as much a delay nuisance as was the necessity to blast rock and boulders.

The week of August twenty-sixth to thirtieth was spent by the main line crew on Inspiration Drive, South Martin Drive, and Canyon Road. I had Martin Rosso's service line crew Monday through Wednesday in the same areas and in portions of three others.

Vic Clyde took over Rosso's crew on Thursday and Friday. He also kept an eye on Rosso's crew Tuesday morning, and Erik watched the main line crew, as I had to make a trip to Reno to file assessment work on the Nevada Diamond mining claim. (The name Nevada Diamond is misleading. When Robert A. Allen and I located the claim, we thought the name appropriate because of the numerous black and translucent obsidian particles diffused throughout the perlite matrix. These particles reflected sunlight sometimes quite brilliantly. I had hired a backhoe on the weekend of August twenty-fourth and twenty-fifth to do the assessment work, and the recording had to be done prior

to September first—that is why I made the trip to Reno.)

On Wednesday afternoon, August twenty-eighth, blasting a rocky area fractured a three-inch plastic water line, and a geyser of water burst forth. I stayed with part of the crew until much after five o'clock until full repair was made.

On Thursday, August twenty-ninth, Vic Clyde watched most of my crew's work, as Erik and I had to run levels to insure sufficient gradient to accommodate sewage flow from three lots into the wyes at the main line.

The same date, a bundle of one-inch plastic lines was severed three feet below centerline at location of manhole B-41-3. These lines apparently led to a sewage drain field. The same lines were again encountered and severed seventy feet beyond the manhole. Considerable work time was required to make repairs of these lines, as they were serving residences and would have to remain in service till the new sewer system could be put in operation.

Friday's work was bugged by severance of several of the water company's plastic service lines and the three-inch plastic main which wandered snakelike in and out of the proposed sewer trench. Erik was to help me place markers for Monday's work on service lines, but because of the trenching problems, I was kept too busy. Therefore, he had to place the service markers alone. In spite of the problems with water line breakage and local sewer line breakage, fairly good progress was made this week.

The two-week work period, the first half of September, was ten working days long, regardless of Labor Day. Labor Day was, of course, a holiday and was used as such; but the crew I was with worked on Saturday, September fourteenth. The crew was split on the fourteenth; I stayed with the crew

supervised by Don Crosby, Joe Krmpotic being excused this date. Vic Clyde was with the crew supervised by Caries Archuleta on the Point Road and Zephyr Heights. Work on the fourteenth will be described later.

Totals of pay items for the crews under my inspection were somewhat less than they might have been, due to tough digging during the second week, plus severances of utility lines already in place. This two-week period included 2,256 of six-inch main, thirty-two wyes, nine manholes, one rodhole, and two four-inch laterals totaling but forty-eight feet. Vic Clyde's crew took care of most of the lateral work during this period, and his report would include this work in his pay item summary. That would be much more than the forty-eight feet I covered.

Work was slowed somewhat Tuesday, September third, by presence of rock and boulders, and at three P.M., the Poclain backhoe was put out of action by a break of the main pin on the bucket. Erik and I placed only two service locations at four P.M. because a proper map was not available. One manhole was placed on Tuesday and one more each working day for the week, a total of four.

Wednesday's work was affected by shortage of experienced help. The two regular pipe layers, Manuel and Mike, both of Mexican descent, quit the job because they were made to haul and unload pipe after the backhoe broke down the day before. Already they had learned how to become "purists" in the U.S.A.

Carlos got in the trench along with a fellow named Reuben— he was an Indian fellow, by the way—and laid the pipe. Three new workmen were hired during the day, but one of them left the job after working only a few hours. Actually, there are no easy jobs in this kind of work, and the workmen who are kept on the job must demonstrate their ability

to take orders and carry them out without shirking and back talk.

A two-inch gas main and a two-inch water main were encountered in the trenching operation. Fortunately, neither were broken, but the trenching had to be moved to one side to avoid such occurrence. A one-inch water service was severed near the end of the day. It was sealed and left to be repaired on Thursday.

Work these four days of the week was done on South Martin, Mountain View, and Riven Rock Road. There was no great amount of trouble Thursday and Friday, but because of dry soil, a considerable amount of water had to be used to secure proper compaction.

Carlos Archuleta was the only foreman present Monday through Friday of the second week in September. There was work on Saturday, but an extra foreman, Don Crosby, was present. Joe Krmpotic apparently was ill all week.

Very good progress was made Monday and Tuesday. Blasting near the end of the shift Monday, severed a water pipe. It was blocked but not repaired until six-thirty A.M. on Tuesday. The work this second week of September was mostly on Riven Rock Road and Canyon Drive.

On Tuesday the owner of Lots 14, 15, and 16 on Riven Rock Road showed us where he had placed markers for services for his sewer lines. This was of help, because no buildings had been placed, and the owner was the only one who knew exactly where he wanted the services. The wyes would be arranged in the main lines to suit his need.

A thin-walled, four-inch water main of seamed twelvegauge metal was severed, but repair was made by welding on a good section of three-sixteenth-inch heavy pipe.

Wednesday, September ninth, was a very slow day. Much time was required to finish backfill, watering, and compaction of Tuesday's

work, as a whacker used in compaction was not available on that particular day. More breaks in water lines also contributed to the slowdown.

Thursday's work was slowed by necessity to deepen the trench to fourteen feet in the hard granite soil on Canyon Point. Blasting was not necessary, but it was tough digging for the backhoe. Carlos had to assist sometimes in pipe laying, as he had rather inexperienced men in the trench. That grade on the main must always be in one direction; and therefore, the pipe layers must always use a level in laying the pipe and making sure that the grade is in the right direction. And a green man sometimes—shouldn't be in there unless it's absolutely necessary. If he is allowed on the line, he should have another man supervising.

The Indian workman, Reuben, was placed in charge of the backfill operation in this deep trench. Optimum water content for the backfill and thorough compaction on the lower six feet of the trench was necessary to make sure there would be no future settlement. Reuben was a good man for the job.

I found a twenty-five-foot surveyor's error between two manholes. I called Erik, and he came to the job, and we made some measured adjustments in the grade. Only fifty nine feet of six-inch line was placed on Friday, the thirteenth. Whether or not the date had its effect on production, I am not sure; however, the trench was deep, rocky, and the digging tough. A loader slid down into the deep trench, stopping all operations. So maybe Friday the thirteenth was well named. A considerable amount of time was lost in removing this heavy equipment from the trench.

Decision was made this Friday to work on Saturday, the fourteenth. Carlos Archuleta and Don Crosby were the foremen. Carlos

directed the crew which was sent to the Point Road and Zephyr Heights Road. His crew's work was inspected by Victor Clyde, and he kept all records of the work accomplished in that area. Don Crosby had a small crew with a small backhoe. And it took this crew, whose work I inspected, all of seven hours to dig forty-eight feet of lateral trenching and [to] lay one eighteen-inch line and one thirty-foot line. These were four-inch service lines. In the late afternoon, however, a trench was started on Stanley Lane easement, but before much progress was made, the gas line to the house of one of the Michelsons was severed. A local resident helped us out with phoning, and a gas company employee arrived to make repairs.

On Monday, September sixteenth, the amount of work—pay items—was limited to thirty-seven feet of six-inch main. This tiny pay item, however, was no measure of the actual work accomplished. The total number of crewmen on Vic Clyde's and my crews together amounted to about twenty men. Our crews were scattered in five separate places. Don Collins and Carlos Archuleta were foremen on my crews, and Martin Rosso was running a four-inch service pipe work inspected by Victor. Vic spent considerable time on the easement above the Point Road and would report the six-inch main and manhole placed in addition to the service lines. Those were placed by my crew, but Victor was going to report them.

At one time during the day, there were as many as five crews of two to five men, each working on miscellaneous duties, such as watering and backfill, cleanup, hauling and spreading pipe for laying in the easements, and doing some actual pipe laying. I spent some time in the afternoon observing the pipe laying operation on the easement between U.S. 50 and Lakeview. The thirty-seven feet of six-inch main, the only pay item mentioned

above, was laid here. I was as busy as the proverbial cranberry merchant was supposed to be.

I also spent some time with the Michelson brothers and so did Erik Beyer. This was with respect to location of services to some of their property along the easements southwest of their Pine Cone Resort. There would be some private work which the contractor would do for the Michelsons, but Erik gave them to understand there would be no district payment nor time spent by the inspectors on such work.

Late in the afternoon, we were informed that the paving crew would be at work on some of the high areas on Tuesday. Carlos's crew Tuesday consisted of three operating engineers, two pipe layers, one water truck driver, and three laborers. Don Collins had the other crew; but crews were moved to wherever needed, and crew members were more or less interchangeable. Vic Clyde watched Don's crew, and I spent most of the day with Carlos's crew.

Pipe on Zephyr Heights was laid by Collins's crew part of the day, but a lot of time was spent by this same crew on furnishing backfill and doing cleanup 'till about five-thirty P.M. Carlos Archuleta's crew worked on three separate trenches, one from U.S. 50 and Lakeview junction easterly, another along U.S. 50 in front of Michelson's Pine Cone Resort, and a third on the easement southeasterly from manhole B-13-6.

On U.S. 50 the backhoe encountered an obsolete twelve-inch corrugated metal pipe which had to be dug out in order to lay sewer pipe alongside the new twelve-inch CMP placed by the state Highway Department.

Manhole B-16-6 was a flattop with a three-way base (that is, three outlets). The top had to be flat rather than a cone because the entire height could be only thirty-six inches.

Carlos Archuleta's crew managed to lay a total of 364 feet of six-inch main in the three short trench areas and constructed manhole B-13-6 and laid four four-inch service lines, totaling ninety feet. I had to lay a grade guideline on the side to secure proper gravity flow in the shallow trench in vicinity of the manhole just mentioned.

On Wednesday, the two crews did not interchange workmen. Vic Clyde was with Don Collins's crew, which spent the entire day on services. I visited Vic for a short time in the forenoon to show him present positions of services which had been changed for the several Michelson properties at request of the owners.

I found out that Erik was watching the paving crew, so I went back to Carlos's crew for most of the rest of the day. They were laying six-inch main on the easement above North Martin. I hadn't been in there long 'till Erik left word he could no longer watch the paving crew. That left me with total responsibility in two separate places. I hurriedly visited Sidney Curtis (that is the Nevada Paving foreman), and he gave me enough general information as to his intentions so that I could return to the pipe laying.

The line on the easement was severely curved in places, and I wanted to watch it carefully to see that sufficient short pieces of pipe were used in order to insure a fairly smooth flow line without bad angles. I would secure information from Sidney Curtis later in the afternoon regarding his operations and pay quantities for the day's paving, which I would add to my daily report. I also had to take time to set sufficient markers on the North Martin easement to enable the crew to make a start there Thursday morning.

Carlos's crew did fairly well on this date, laying 330 feet of six-inch main, and much attention was paid to securing sufficient water

to obtain specified compaction of backfill. In a supplementary report on paving, I showed Sidney Curtis as foreman, and one paving machine operator, one screed man, one raker, one boot man, one roller operator, one motor man and thirteen truck drivers. Due to the rugged, uneven nature of the pavement voids where sewer line trenching had to be done, it was a real problem to secure a totally satisfactory surface. The top inch or two of dirt backfill in the trenches had to be removed. The edges and adjoining pavement had to be cleaned and primed with liquid asphalt, so the new paving would adhere. Quite a lot of hand labor was necessary.

Aggregates for the paving mix was three-quarters maximum size and graded from that size on down to dust. The aggregate originated from the state-approved material furnished by Nevada Aggregates. Shell Oil Company was supplier of the asphalt, which was 85-100 penetration grade. Temperature of the stockpiled hot aggregate mix, which—the stockpiles were placed conveniently along the proposed repair, and that temperature varied from 235 to 240 degrees the several times I checked the piles for temperature.

Sid explained the difficulty of getting uniform thickness of the spread in the roadway irregularities. I agreed with him that it was a difficult operation, but I complimented him in his effort to secure the smoothest job possible under the circumstances.

The primer used prior to paving was liquid asphalt emulsion and was applied at the rate of one-tenth of a gallon per square yard. Paving material was used to fill holes and other badly scored areas before paving entire trench area with the machine. Weight of paving material used this date was not obtained because of stockpiling; therefore, scale weights of the truckloads for a week's operation probably would have to be used.

Paving contractors who've had a lot of experience can be depended upon to help a lot where inspectors and engineers are too busy to get all of the details, and they usually will supply either the original or copies of all the paving weights. (I have gone into considerable detail on the procedures this date so that future readers can better understand mid-twentieth century operations of pavement patching in a situation of this kind.)

On the following day, operations of both paving and the pipe laying crews were pretty much the same. Carlos Archuleta's crew used an additional backhoe, one smaller than the Poclain, to excavate for manhole B-26-3. This hoe was on tracks instead of tires, and it was much more maneuverable than the big Poclain hoe, which was used most of the day on the lower easements below North Martin.

Carlos's crew managed to lay an even three hundred feet of six-inch main in two different areas. They placed manhole B-26-3 and five wyes. Water was badly needed everywhere that pipe laying was done. The soil was extremely dry to a depth of as much as five feet. I was with the pipe crew all morning, as the paving plant was down with mechanical trouble until noon. I divided my time between the two crews in the afternoon, also managed to set several wye markers for tomorrow's work. The paving, which was completed this afternoon, had very good appearance. There was only one water pipe severed during the pipe laying Wednesday and Thursday. I did not make a separate sheet for paving operations this date.

On Friday, Erik brought Merle Sawyer in to help me on the pipe inspection, so I could spend more time with the paving crew. Merle had been observing a concrete pour at Cave Rock which was temporarily delayed. I went with Erik for a short time to fix positions for service -markers on Lots 1 and 2 near the

Michelson's properties. I spent some time briefing Merle on what had been done, and went again to Sleepy Hollow Circle for a short time to set markers for services in that area. I spent the balance of the morning with the paving crew, for I was to return to the pipe crew at one o'clock, as Merle would again be with his concrete pour at Cave Rock.

Actually, I did not get back with the pipe crew until three o'clock. I had found too many paving problems in a difficult area at the intersection of Lakeview Drive and U.S. 50, and stayed with that crew 'till the problems were pretty well solved.

The pipe crew had placed six-inch line in three separate places—260 feet on the easement above North Martin, forty-four feet on North Martin itself, and fifty-seven feet on Sleepy Hollow Court. They also placed two manholes, four wyes, and one rodhole.

The paving crew had the same personnel as described on Wednesday's report, except that the trucks and truck drivers were increased to seventeen. Fourteen of the trucks were semis, and three were ten-wheelers. Paving this date was done on Jerry Drive, Marge Court, a portion of Don Drive, most of Lakeview Drive, and the Don Drive intersection. Depth of the paving averaged one and a half inches, but variations were numerous. Repair of holes and unevenness caused an overrun, and Sidney Curtis was twenty to thirty tons short on Lakeview Drive, which probably would be finished Monday. Sidney stated that in order to get as much of the paving done as possible at present, a new policy would be put into effect: Sidney's crew will do only the trench paving, and a patching crew would come along and do finishing, which would pick up all areas outside the main trenches, such as chuckholes and dents. Thus the principal paving crew would move along without stopping for

patch work, except where second runs would be necessary, such as in circular courts and intersections. Edges would be feathered only where crossing driveways or other paving or near dikes. Vertical ledges would be left in on other places, and the contractor would blade and compact soil against them, a common procedure. Sidney said that Lakeview Drive would be finished Monday, the twentythird; and that would finish all that was intended for the present.

The following work week was fraught with breaks in the water company's two-inch plastic water main. In fact, there were so many breaks on Tuesday, September twenty-fourth, in one section of the snakelike line that Mr. Hall, the owner, insisted there were too many breaks; and although they were all repaired, he insisted that the Byars Company should replace the line area with a metal pipeline. Later, after a conference between Mr. Hall and Leo Tuccori, Leo decided to put in 127 feet of new water pipe; but he used plastic pipe, the kind that was broken, instead of steel [laughs]. Difference in price between plastic and steel is considerable.

On Monday we presumed the crew would finish Lakeview Drive, but they did not appear. What they did do, of course, when they were paving was just about all of the areas we had ready to pave. That doesn't mean that all these streets which were mentioned had all parts of them paved—just parts where the pipe was all laid and checked, and cleanup was made so that paving could continue.

There was only a small amount of pay items this Monday, but much work was required in excavating a twenty-foot hole for manhole B-40-l, which was, in fact, one of the smaller pumping stations. The manhole base contained four two-foot sections and two one-foot sections. They were put together, thus partly finishing the manhole. About one

foot of one and a half- to three-inch size gravel was placed under the base to improve support. Also, six or seven cubic yards of the same kind of gravel were placed along the easterly side of the manhole. Two more breaks occurred in the plastic water main and were repaired by Carlos.

Upon arrival in the following morning on North Martin, I contacted Martin Rosso, foreman of the service line crew, and showed him the method of laying out service lines on Sleepy Hollow Court. Merl, instead of Vic Clyde, would inspect the Sleepy Hollow service lines and would make out the daily report for his work.

In spite of water line trouble on Tuesday, the twenty-fourth, 210 feet of six-inch main was laid, three wyes placed, and flattop manhole B-40-4 was built. Martin Rosso called me on Tuesday to get positions of service lines on the easement above North Martin. After attending to this, I came back to my project in time to see a three-inch water main broken; this was four-twenty-five in the afternoon. This was broken by the Poclain hoe on the Canyon Road. The break was not repaired until after quitting time.

Quantity figures for Wednesday, September twenty-fifth, do not appear to represent a good pay day. Nevertheless, a lot of good, hard work was done and some time-consuming work on Mr. Hall's water line, also. A new 127 feet of plastic pipe was placed, and Byars Company agreed to repair another place, which was given a close inspection by Mr. Hall and me. This was where the Byars crew had placed a patch where pipe had been severed on Canyon Drive. The Byars patch was okay—no leaks. However, a slight leak in a water company joint (probably put in years ago) was found. Mr. Hall, of course, laid the blame on the Byars Company, saying they had put too much tension on the line in putting

together their repair joint. Leo Tuccori, rather than wasting time on argument, secured pipe, disassembled the line, and put in a ten-foot section of new galvanized steel. I inspected the repair, and after a very slight leak, which was taken care of by tightening the bands, I approved the job.

The new water line was placed about one to one and a half feet above the sewer line in the same trench. This made problems, but they were solved.

Concrete pours were made on both inside and outside of pump station manhole B-40-1, using aggregates from the Dayton pit and five and a half-sack per cubic yard mix with a slump I estimate to be barely under four inches. (To again offer explanation, the term slump refers to the consistency of the fresh concrete mix. A stiff mix may have a slump of about two to two and a half inches. The more fluid mixes will slump four inches. It is not good policy to pour a mix too wet—that is, with too much slump—as it tends to severely lessen the compressive strength of the cured concrete.)

We endured a very cool and windy day Thursday, September twenty-sixth. Work on Canyon Drive and on Hillcrest Drive consisted of laying slightly more than 250 feet of six-inch line, placing three wyes, and building manhole B-4-4 with a four-way base. Some time was spent by the crew watering backfilled trenches and compacting on Hillcrest, which was left open yesterday due to lack of water. The water truck and his driver were commandeered to fight a forest fire on the California side of the Lake. The driver was back on the job this date but in a half-stupefied condition, as he had been firefighting all yesterday afternoon until six o'clock this morning.

Another water line break gave trouble in the morning, and much of the day's time was

spent in watering and backfilling some deep trenches which had been only partly filled during the past ten days. Such trenches were compacted by use of the whacker, except the top one and a half to two feet. This upper area could be compacted by wheel-rolling with a loaded piece of equipment.

The deep pumping station manhole, B-40-1, was finally completed Friday, September twenty-seventh. It contained a two-foot high base, concreted inside and outside; six two-foot sections, and three one-foot sections—making a total depth of seventeen feet. No pumping machinery was installed in the manhole at this time. The crew also placed 330 feet of six-inch; eight wyes; one small manhole, B-40-2; and one rodhole. Work started this date at six-thirty A.M., and some crewmen put in a nine-hour shift; but a repair crew did not finish the water line repairs of three different breaks until six-thirty P.M. Crewmen tried to eliminate broken water line trouble by doing a lot of hand-digging, but this proved impractical because of extremely slow progress. This day was indeed a long one.

This week's work I have covered pretty much in detail because explanation is needed to account for low pay items—that is, low pay item count—which was caused by construction of special structures, such as the pumping station manhole, and special water lines. The type of paving necessary to repair roadways also needed some detailed explanation.

This ten-day period of detailed work showed only the following pay items for the pipe crews under my inspection: 2,303-1/2 feet of six-inch sewer main; thirty-two wyes; nine manholes, including Number 40-1, which in reality was a pumping station; two rodholes; and 364 feet of four-inch service lines.

The following two-week period contained eleven instead of ten working days, because the contractor wanted to get as much four-inch service line laying as possible so that more cleanup and paving could be done. The first two days, there were two foremen, Carlos Archuleta and Martin Rosso. The last nine days, Carlos was the lone foreman. There were usually three operating engineers each day and two pipe layers. However, during the two days Martin Rosso was present, there were two separate crews at work with a total of four pipe layers, and laborers varying from three to five, and there was usually one water truck operator. Equipment consisted of two Case backhoes (the Case backhoes were smaller than the Poclain), the one on rubber and the other on tracks; there was one Michigan loader; one water truck; and one small compressor on standby. The Poclain hoe was used Monday, September thirtieth, only.

Most of the work these eleven days was involved with laying the four-inch service lines from the wyes to the property lines. Two thousand, two hundred and twenty-six feet of service lines were laid to ninety-five lots on parts of ten different streets. Only 455 feet of six-inch main was laid. Two manholes were constructed, and two wyes were set in the six-inch main. There was one four-inch pressure line laid for a distance of fortyfive and a half feet. This kind of pressure line is used to carry pumped fluid from a collecting manhole to the main pressure line, which leads to the treatment plant on the Kingsbury area. A description of construction of such a manhole was given in late September.

On September thirtieth and October first there were two crews as previously stated, but they were separated further into four groups on September thirtieth and worked in several places. Merl Sawyer inspected the two easement lines off Martin Drive and

Zephyr Heights, and I took the laterals on Sleepy Hollow and the deep trench portions of Alma Drive easement. Men kept his record of pay items. My crews spent most of the time digging trenches but laid laterals to five lots and placed thirty-one feet of six-inch main.

The following day, October first, Men and I both watched operations along the easements above Inspiration Drive. We had two Case backhoes at work; the Poclain hoe apparently was sent to Logan Shoals to assist in one of the pumping station sites.

I kept a record of all pay items this date, which included a hundred feet of six-inch main, two wyes, one manhole, also 171 feet of four laterals which served seven different lots. Carlos Archuleta was the only foreman and with only one crew for the next nine working days, ending with Saturday's work on October twelfth. Merl had been assigned to watch completion of the manholes where trenches had been paved. (A little explanation there—during initial trenching and laying of the main line, the manholes were not fully completed. Usually, they were left six inches to a foot below what would be the surface of the completed asphaltic pavement over the trench. A small working crew was assigned, after the trenches were all backfilled and after paving took place, to the matter of adding sufficient rings of appropriate heights to bring the cover to exact surface of the newly paved surface.)

Since Merl did not need to spend all his time with the small crew, Erik assigned him to assist me whenever he could do so. I don't remember at the present time what happened to Joe Krmpotic. He may have been assigned to other portions of the job, or he could have been temporarily laid up with health problems. Nevertheless, Carlos Archuleta carried the guidance of his crew very well. He also was expert at making repairs to the numerous water line breaks.

On Wednesday and Thursday, October second and third, work was pretty much confined to the tough digging for service lines in Canyon Road and Inspiration Drive. Drilling and blasting was necessary and had to be done with great care on account of a maze of underground water and gas lines. It was not possible to do the job without some damage to these lines, but repairs by the gas company and by Carlos on the water lines were expertly made.

On Friday, October fourth, Men spent most of his time on manhole finishing and line testing, but helped me when he could spare the time. All the pipelines and manholes had to be tested for leaks before final acceptance. Most of this testing was inspected by Merl and by Melvin Fodrin. Carlos helped lay some of the four-inch services in areas which were difficult with respect to grade; and he gave Reuben, the Indian, the responsibility of backfill and watering operations, a task which Reuben did very well.

Weather at this time of year at Tahoe is usually cool early in the morning, but warms up and is partly cloudy for a greater part of the day, although sometimes it is perfectly clear.

The work week of October seventh to twelve contained one extra day, Saturday, the twelfth. Most of the pipe laying was limited to four-inch service lines, although 173 feet of sixinch main was placed on the easement above manhole B-41-2 on Canyon Drive. Erik Beyer assisted in locating position of wyes in the easement, but I had to make changes later because the owner of Lots 11 and 12 changed his mind regarding the original locations.

A fairly good shower occurred in the morning of October eighth; and while it settled the dust very well, problems resulted from the wet clay soil on the steep grades. Rubbertired equipment did so much sliding that the backfill job was somewhat delayed.

Thirty-nine feet of four-inch pressure line was laid late in the afternoon from manhole pump station B-40-1 westerly to the edge of the highway. Three hundred feet of four-inch service lines were laid to serve ten lots.

On Wednesday and Thursday, October ninth and tenth, sixty more lots on Hillcrest, Canyon Drive and Mountain View streets were provided with about 410 feet of four-inch service lines. About forty feet of a special six-inch main was laid these two days also.

Erik and I tried to locate, but without success, the property corner between Lots 30 and 31 on the easement above Canyon Drive. Erik later brought in a survey crew to do the job. Merl spent as much time as he could away from his manhole and testing job to help me on some of the services.

I have already mentioned that work was continued on Saturday. October twelfth, in spite of the fact that October eleventh was a very busy and productive day. Three hundred and forty-five and a half feet of four-inch lateral were placed to twelve lots on Riven Rock Road.

Men was too busy with line testing, so he could not give me much help with my crew on Friday, and he was not present at all on Saturday, the twelfth.

One portion of a service line to a lot had to be removed Friday, and the trench hand-dug to remove a high spot. The pipe was then relaid after grade had been corrected.

Saturday's work completed services to nineteen lots on Riven Rock, Mountain View, and Alma streets. Paving and repair of the street was not attempted until the lateral trenches for services and testing for leaks could be completed. Thus this fall flurry of paving service lines was necessary to get as much of the paving finished as possible before extra cold weather occurred. Also, of course, all the testing for leaks must be completed.

Most of the work during the two weeks period from October fourteenth to twenty-fifth was on several easements. Laying of six-inch sewer mains predominated, but there were some service lines laid, and special work was required later in the week on Hillcrest easement. Pay quantities for the period included 2,144 feet of six-inch main; 441 feet of four-inch service lines, which served twenty lots; six manholes; twenty-five wyes; 250-1/2 feet of four-inch pressure line; and three six-inch elbows—one was a ninety-degree and two were forty-fives. These elbows also required embedding of them in the concrete thrust blocks, which prevented movement and chatter in the line.

The weather during the period was for the most part Octoberish bright blue variety, with a few floating flocks and wisps of clouds with the skies azurous, augmented by the beautiful blue of Tahoe. Mornings were frosty and cool, but most of daytime temperatures were comfortable.

Unlike the production of September thirtieth through October twelfth, which was mainly with four-inch service lines, this next two-weeks emphasized six-inch mains, mostly on crosscountry easements. Several bothersome problems are involved in construction of pipelines on the easements. Many were quite steep, and rubber-tired equipment—such as backhoes, loaders, and water trucks—had trouble operating. Another problem was with trees. Cleared widths on these easements were narrow, and many of the trees were badly scored by the equipment. Injured places were treated, but in some cases it was necessary to remove badly injured younger trees. When water trucks could not be used, the backfill had to be moistened by long lengths of hose.

Two problems did occur for the contractor. There were no four-inch laterals for him to

lay, as all locations of wyes on the six-inch mains were marked by redwood two-by-fours. Therefore, the property owners only had to go to the wye itself to get a connection to their houses. The property owners, of course, could make their own connection with their own contractors whenever they were ready to do so. And another proposition on these easements is that there is no paving.

On Monday, October fourteenth, only one backhoe operator came to work, and the one hoe he was operating broke down. Further slowdown occurred by a lack of water truck, as the pipeline testing crew was using it. By eleven o'clock, however, the one hoe had been repaired and a substitute operator was obtained so that both backhoes were again at work. Carlos and a stub crew stayed on the job 'till dark preparing a trench for Tuesday's pipe laying.

On Tuesday, the fifteenth, one pipe layer and one laborer from Don Collins's crew were added. This speeded operations on Stanley Way and on other streets nearby so that a total of ten service lines were laid. This made possible the paving on Stanley and several other nearby streets. Carlos, two laborers, and a water truck remained on the job 'till fivethirty P.M. and finished watering and compacting on the ten service trenches.

There were not many pay items completed on Wednesday, the sixteenth, but much work was accomplished in several places. Hand labor was used to finish backfill, watering, and compaction, as a portion of an easement where they were working had too many trees to get equipment in there. An easement trench above manhole 42-3 on Alma Way was pioneered and finish digging was done before the day's end.

Merl Sawyer's crew was busy on the Alma-Stanley area testing for leaks. The contractor's cleanup gang with the grader, roller, and

power broom kept busy getting the entire upper end ready for paving.

Erik Beyer was on the job from eleven-thirty 'till twelvethirty, and discussed with us some of the immediate problems; he helped me set wye locations on the long easement below Alma Drive.

We had one problem arranging for service to Lot Number 5. The house was to have been built directly over the six-inch sewer main. This meant encasing the six-inch sewer line in concrete or using a steel encasement pipe. The wye would then be placed at the south end of the encasement. Men Sawyer, in addition to being an inspector, also did private work with his own backhoe. On weekends or after job hours, he would dig trenches and lay pipe from property lines to the owner's house. Since the district required inspection of such lines and Merl was not in position to do it himself, I did the inspection and made out a report for each lot. I helped Merl on my own time for about six of these private operations. I did not receive any remuneration for this from the district or from Merl.

On Thursday, October seventeenth, paving was to begin about nine-thirty. Erik was on the job at that time and suggested that I stay with the pipe laying on the easements. He said Vic Clyde did not have too much to do on the service line crew, and he could watch the paving. This saved me the worry and extra work on trying to watch two separated and very busy operations at the same time.

Carlos Archuleta's crew this date consisted of eleven men, and work was confined to the Alma Way easement on the east side. Equipment included two Case backhoes, both on rubber; a four thousand-gallon water truck; and compressor and drill rig on standby. You always have to have a standby compressor and drill rig; you never know when you're going to strike in a rocky place,

or a big boulder in the trench would have to be drilled and blasted.

Work was completed on 271 feet of six-inch main on the easement between manhole B-16-1 and B-16-2. These manholes were also completed, and three wyes were placed.

One of the backhoes on rubber was sent to the Sleepy Hollow easement to pioneer a trail and dig part of the trench. I visited this operation with Carlos, and we found the operator could not make headway with the rubber-tired rig. Carlos sent him to South Martin to complete the partly filled trench from South Martin to U.S. 50. The water truck would have to wet down the material.

Work on the Alma easement was satisfactory except that some fencing was broken down and would have to be repaired later.

While pay items for Friday, October eighteenth, were limited to 190 feet of six-inch line and two wyes, there was much work done, such as backfilling on the entire easement above Alma Way, repairing damaged fences, finishing the backfill on the easement trench between U.S. 50 and Lakeview Drive intersection, and the South Martin road. It was also necessary to prepare six-inch pipe with redwood strips to insert into the larger steel pipe encasement on the easement where a house is to be built directly over the pipe. This work—part of it—was done this date.

Cleaning crews with blades, water truck, power brooms, and loader were busy on Alma Drive getting it ready for paving.

Monday, October twenty-first, all pay items were on Sleepy Hollow easements and consisted of 210 feet of six-inch main, sixty-six feet of four-inch service lines, two wyes, and two manholes. Erik Beyer joined me later in the day, and we checked locations of property lines and service locations in the immediate area where work was going on.

At three P.M., I visited the easement above manhole 40-7 and selected locations for wyes for four lots. The trench had been dug, and six-inch line would be placed tomorrow.

Tuesday and Wednesday's work was on Canyon Drive and Sleepy Hollow easements. On Tuesday, 140 feet of six-inch line and four wyes were placed in the area where I had marked the wye locations yesterday, and 273 feet of six-inch line and four wyes were placed on Sleepy Hollow easement. One manhole was constructed. The water truck was sent elsewhere in the afternoon of Tuesday, which meant that only partial backfill could be done until more water could be obtained.

On Wednesday, 473 feet of six-inch line was laid on easements, and manhole B-36-1-A was constructed after having to move it thirty-five feet downhill—that is, easterly—from the location shown on the plans. If built where plans showed it would be, [it] was exactly on top of a guy wire, deadman—a deadman being used for holding a telephone pole in place. Changing location also saved removal of two large Jeffrey pines. There were no “ecologists” present at the time to compliment us [laughs].

Water and gas pipe interference seldom gave us problems on the easements, as most such lines which gave us the problems were in the streets.

I would not allow a ninety-degree elbow to be placed yesterday at a turn in the line where it was carrying a heavy load; therefore, short sections of pipe were secured Thursday. However, when Erik arrived on the job site, he thought it would be wise to place a manhole at this point. However, the contractor's superintendent suggested using a long, banana-shaped pipe, which would ease the flow without interfering by several angles of the short, straight lengths of pipe. The banana won the argument.

Most of Thursday's work was involved in watering and compacting backfill on easements. Narrowness of the cleared area in easements made operation of digging equipment and loaders and water trucks very difficult.

Owner of a house near the pumping station called my attention to a mistake I had made in setting the wye marker. I believed from the position of his house that it was in Lot Number 10 and set the markers there. This date the owner brought me his map, which showed his house on the west edge of Lot 11. I had placed the marker on basis of the plans for the job, but the owner's map disagreed with the job plans, so I let him have his way.

On Friday, October twenty-fifth, seventy-nine feet of sixinch main was placed from yesterday's work to manhole B-40-9, and both gravity and pressure four-inch lines were placed, forty feet of the former and 188-1/2 feet of the latter.

Work was slowed by presence of boulders and solid granite requiring drilling and blasting. One area required a change in direction of flow lines. Carlos Archuleta devised a system whereby two forty-five-degree-angle sections could be used with a straight section between them. The forty-five-degreeangle sections were held in place by driving the reinforcing steel bars into the ground and bending it around them, then pouring concrete at the angle points. This would hold the pipeline in place and prevent chattering. A third thrust block was necessary in another angle point.

There was no work on Monday, October twenty-eighth, most likely due to bad weather. As a matter of fact, there were only two working days this week—Tuesday and Wednesday. Thursday, the thirty-first, however, was Admission Day and a holiday. Why there was no work on Friday, I do not know. (This was

the first Admission Day for more than thirty years that I did not participate in the parade with the Shrine band, nor in the afternoon concert given by the Reno Municipal Band. The Shrine band had been disbanded, and I no longer played my French horn with the Reno band. The matter of practice and concert attendance was much more than I could handle and work as an engineering inspector.)

The working days for the period October twenty-eighth through November eighth were different from previous work, in that there were very small amounts of pay items and more miscellaneous work, such as cleanup ahead of the paving crew and miscellaneous problems. The pay items for the seven working days included the following? 337 feet of six-inch gravity main; eleven wyes; two manholes; one rodhole; 330-1/2 feet of lines serving eleven lots; two reducers from six- to fourinch; one four-inch stub; and sixty-seven feet of eight-inch steel casing, one-eighth inch thick.

On Wednesday, 150 feet of six-inch line and manhole B-42-1 were installed on the Hillcrest easement. Sixty-seven feet of this pipe was that part which had to be protected due to the weight of the residence placed over the top of it. The protection device, as explained previously, was the eight-inch steel pipe, and the pipe was protected from rusting by wrapping it on the outside with a one-foot wide spiral band of asphalt-treated coated fabric. And the spiral band, which was made of paper, also contained reinforcing—appeared in something like a screen. The transite pipe was thrust through the steel pipe joint by joint, the transite pipe already having been fitted with redwood siding and contact strips. This was an unusual method of construction, but altogether a necessary one. Constant downhill grade had to be maintained to accommodate unimpeded flow

of the sewage. The soil under this part of the line had to receive extra heavy compaction to insure uniform support and uniform flow.

Erik Beyer visited the job around noon, in time to give instructions relating to laying of this special line. Later, Carlos and I visited four easements on the Zephyr Knolls area, which had not yet received the pipelines.

On Thursday, the thirtieth, we were working on the easement between Hillcrest and Alma. We had gone about 160 feet southerly from manhole B-42-1 when Erik arrived and stated that there were erroneous markings on the survey stakes. Carlos stopped construction immediately and moved the crew to cleanup jobs and had the loader move soil where it would be needed to complete backfill on the easements. It was fortunate that the mistaken markers' guides were not followed further, as we would have been under the balcony of a house had we made another two hundred feet [laughs].

Making the change would necessitate building a fill over the line, which now would have Co be placed on top of the ground to obtain proper grade. By so doing, a small gully would be left between the two houses which would not do any particular damage, but the fill could be placed in a manner which would produce a gently sloping landscape, and the trench would be eliminated entirely. The pipe would still be covered with the specified amount of cover. This fill, however, came close enough to the wooden pillars holding the house that they would be covered for about ten inches; but this part of the wood could be protected by encasing it in an asphalt-coated fabric. The owner's permission for making these changes should not be difficult to obtain! [Laughs]

On Monday, November fourth, the crew was divided into two sections—one section with the Case backhoe on tracks with two

pipe layers and four laborers. This crew worked on the steep easement off Lakeview Circles. The second section with one pipe layer and the other backhoe was assigned to finishing placement of four-inch laterals on the easement off North Martin between upper manhole B-28-4 to manhole B-28-5. Carlos and I alternated between the two projects.

I had a problem about eight o'clock. I had taken what we called the shortcut from Sleep "Hollow to Lakeview"; however, someone had blocked the steep road with a locked chain. I could not back my car because a slippery wet spot on the steep grade caused the wheels to spin. Johnson with his Case backhoe on tracks was only a short distance away, and he pulled me far enough uphill to a place where I could get traction with my back wheels.

Pay items were rather skimpy this date due to steep terrain and narrow passageways which resulted in much hand labor where machinery could not operate.

Tuesday, November fifth, was another low pay item day, again due to work in tight quarters, and a lot of time was spent in drilling and blasting. The work was on Lakeview Circle easement and on a North Martin easement. By ten o'clock, all pipeline had been laid on the Lakeview Circle easement, but backfill and compaction was not finished 'till three-thirty P.M.

More progress was made on Wednesday, November sixth. Johnson with his backhoe on tracks was at work as early as seven A.M. on an easement above manhole B-35-3. He had the trench all dug, and laborers had it graded by ten A.M.

Johnson then was sent to the fifteen-foot wide easement above Beverly Circle where an out-of-the-ordinary problem had to be solved. A four-inch lateral had to be placed in the easement all the way from the six-inch main, twenty-eight feet above manhole B-34-

3, through Lot 73 to the southwest corner of Lot 104, where the residence fronts on Canyon Circle. Johnson did what he could by making an approach off the easement, but all the lower two-thirds of the trench was so rocky that blasting and further excavation would be required. It seems contractors all prefer to leave some of these special problems 'till the job is almost complete.

A delay in laying pipe in the areas containing sharp angles was also caused this date by lack of short lengths of pipe. Instead of buying the pipe, the superintendent directed the foreman to have qualified laborers cut the longer sections into short pieces, then machining the edges so that one piece would fit into another. I found that many of these fits were unsatisfactory, and I rejected them. The contractor claimed short pieces were in short supply on the market; nevertheless, some were obtained.

Crews were scattered in several places. I took some time to look over an installation of service lines to Lot 15, which was not—or I was not told it was being installed yesterday. I found it two feet short of the property line. I took Carlos to this place; and he, too, had not known about it because of the scattering of workmen in so many places. The extra two feet would be laid tomorrow.

A hundred and forty feet of six-inch line, one rodhole, one reducer six-inch to four-inch, forty-nine feet of four-inch service lines to three lots, and three wyes were installed this date.

On Thursday, November seventh, the only pay item on the district contract was eighty-five feet of four-inch service lines from twenty-eight feet above manhole 34-3 on the easement off Beverly Circle. However, 228 feet of four-inch pressure line was laid for a pumping system on the Bastian property about two miles north of Cave Rock. This was a private deal, but Carlos

asked me to inspect it, which I did, because such a line must be approved by the district or its representatives, as it would eventually be a part of the regular sewer system.

I also observed trimming of grade where a gravity line had been laid, but removed. In addition, I observed all the testing for leaks in the 228-foot private line. I made out the report and had the office girl, Lorrie, type two copies, one of which was retained for the district file, and the other I gave to Carlos Archuleta.

Today's crew was divided with three men on the Bastian property. Johnson with the Case backhoe on tracks was finishing backfill over on Virginia Knolls easement with a water truck and one laborer. Hobbs with the loader and one laborer was cleaning up on the North Martin easement.

In the afternoon the Tahoe Western Concrete Company furnished five and a half-sack concrete to finish repair to a concrete driveway which was partly destroyed by the contractor. Concrete had satisfactory slump, and finishing was good.

Late in the afternoon I joined Erik and owners of Lots 3 and 4 below Alma Way in coming to an agreement on new location of the six-inch gravity line. I also observed blasting and clearing and grading of the trench on the rocky easement off Beverly Circle. Eighty-five feet of four-inch lateral to Lot Number 4 was laid, but I did not get a chance to finish inspection 'till after five P.M.

I called Erik's attention to the gas company's severing of a water line while a new gas line was being placed on Hillcrest Road. A large volume of water ran down into the pump station manhole B-40-1, causing heavy silting in the manhole and the pipe work in the lower end of the sewer line.

An indication of what to expect from the weather was evident by the beginning of a snowfall about five P.M.

Friday, November eighth, was cloudy and cold. Presence of snow on all roads, although in small amounts, hampered progress. Seventy-two feet of six-inch gravity line was placed on the easement below Alma in the new location discussed with owners of Lots 3 and 4 yesterday. Thirty-one feet of four-inch service line was placed from the wye in Beverly Circle to Lot 104. Considerable fill material for the six-inch line below Alma Way had to be imported from the area near manhole B-42-1 in order to perfect the grade, which was critical, as the fall was very shallow. I was unable to visit the upper easement on Beverly Circle 'till late in the afternoon on account of poor traction the steep snow-covered road;

As a personal experiment, I scattered seed of nicotiana (flowering tobacco) all along the finished easement on Beverly Circle and along the easement below South Martin. My intention was to find out if this tough, hardy annual would grow in spring and survive a dry summer, bloom, and make seed, and propagate itself in that situation. [Laughs] Actually no one ever— I went up there and couldn't find anything, so I guess it didn't work!

The first four days of the work week November eleventh to November fifteenth [1974] was devoted to finishing most of what pipe laying was left; placing a couple of wyes; and constructing two manholes, one of which was an air-release manhole in a pressure line. Only 209 feet of the six-inch main and forty-two feet of service line was laid, the latter to two lots only. A considerable amount of four-inch pressure line was laid—416 feet, in fact, in these four days.

A good part of the six-inch line laid previously above manhole B-42-1 on the Hillcrest easement had been removed and could not be replaced until decision was finally

reached where to place the line with respect to Lots 3 and 4. The decision was to place the line near the porch on Lot 4, but first building a wellcompacted fill to bring the grade in the low swale high enough to accommodate a smooth flow. An agreement also was made with the property owners to grade the area in the immediate vicinity to allow planting. The porch pillars, which were partly covered by the fill, were given protection from contact with the soil, as described previously.

I spent some time in the late afternoon November eleventh marking areas on the Zephyr Heights and Zephyr Knolls which will need erosion control with rock riprap or with redwood planking. November eleventh was not an observable holiday, as the contractor wanted to be sure all street areas not yet paved were cleaned and made ready for patching and sealing. Carlos Archuleta's crew was somewhat reduced in size by using only two or three laborers instead of five.

Tuesday, November twelfth, had most of the working time put in on construction of the air pressure release manhole which had to have gravel placed under and around the base. Concrete also was poured around the base and was also poured around a forty-five-degree elbow eighteen feet above manhole B-42-2 constructed November eleventh. Only sixty-three and a half feet of four-inch pressure line was laid, and it was laid to— or part of it anyway—to and through the air pressure release manhole. Part of the time was occupied in backfilling, watering, and compacting trench for six-inch gravity line and some of the four-inch pressure line trench. After four P.M. Carlos with the loader and two laborers dug out and repaired a leak in a water line service saddle to Lots 28 and 29 on Canyon Drive.

On Wednesday, the thirteenth, forty-two feet of four inch lateral was laid on the gravity

service to Lot 10 on Hillcrest, and 237 feet of four-inch pressure line was laid on the Hillcrest to Alma easement. This finished all the pipe laying on Zephyr Heights, but testing of the lines was not yet finished. All pipelines, before they could be put into use, must be tested for a smooth flow and for leaks.

Before seven o'clock this Wednesday, I received a phone call at home from Erik Beyer, who asked me to stop in at Meder's at the Lake and affix markers to two residences which had not been given laterals. Now Meder's area was not on one where I'd had done the inspection, but Erik asked me to do this, which I did. I first conferred with the owners, however, as to a logical place for outlets for the residences.

Again at four o'clock, I visited the same area with Erik Beyer to see if other places had been missed in this area. While there were no other missed places near Meder's, there were two missing markers for Lots 3 and 13, both north of Judge Ellworth Chappelle's. On checking my plans and daily diaries at home that evening, I could find no record of constructing these laterals—that is, the laterals near Chappelle's place—and this is still to be done.

The work on the Hillcrest-Alma easement was well done, but there would be further backfill and compacting to do.

Thursday, November fourteenth, was a mild day, same as were the three previous days. There were no pay items this date, although eight full hours of work was done. Work was confined to backfilling, watering, and compacting unfinished trenches; general cleanup; and grading around the Lovewell residences on Lots 4 and 3. The extremely rocky area on the hillside traversed by four-inch pressure line also was well finished, in keeping with the nature of the terrain.

This day's work was well managed by Foreman Carlos. Equipment operators and labor crew also deserved much credit.

The next nine working days were involved principally in constructing erosion protection devices. They also represented the remaining working days in the month of November. Some explanation of the need for erosion protection devices and the kinds of material used in building them is briefly covered as follows: erosion protection in this area refers to water erosion only. Melting snow and heavy rainfall [tend] to make ugly gullies in the easements on the hillsides and leave unsightly scars along sloping sides of the roadways where service lines have been placed from the main in the street to the property lines of the lot owners.. There is no paving over the sewer main trenches in the easements; and where the slopes are critical along the regular streets also, there must be some kind of simple structures placed to divert the water either to undisturbed landscape along the sides. Vegetation and natural compost there will spread and absorb the water so that it will do no damage.

The contractor has no service lines to put in as a rule to the lots or residences which may be served off the easement. He puts in wyes on the main only, and the owner must put in the service line to his residence.

Erosion devices on easements are always redwood planks, three inches by twelve inches, and may be from six to twelve feet long depending on the width of the disturbed soil and upon the angle at which the planks are set. The soil is compacted around the buried part of the planks—two to three inches of plank are left above the ground to divert water.

The number of planks per given distance along the easement—say, a hundred feet—will depend upon gradient, principally. Steep

places may need a plank every twenty-five feet or so. Lesser gradient requires fewer planks.

Earthen dams are not reliable as mountainside erosion controls. Protection of the banks along the paved roads where the four-inch service lines end at the property at a depth of from three and a half to five feet is usually done by placing rock riprap from the top of the trench at the property line to the lowest placement, starting at the bottom and continuing upward. In case of steep banks in unstable soil, Portland cement and sand grout is placed between the stones. In case the latter method was not shown on the plans, the contractor would be entitled to an extra work order to take care of the additional expense.

Engineers were years ahead of ecologists in handling the situation just described. In fact, they were giving sensible attention to our environment long before some of our very modern bureaus, which attach grandiose import to their policies, adopted the moniker "ecologist." (That's kind of a long one to digest, but I think it's—[laughs].)

Friday, November fifteenth, erosion protection was started by placing riprap at the base of a hill on Lot 3 on Zephyr Heights Drive. Foreman Carlos sent two pipe layers, a backhoe, and one laborer to take care of a private job on Lakeridge. Another portion of his crew stayed with the riprap job on Zephyr Heights; they finished riprap service line intersections for three lots and on a steep approach to an easement intersecting Zephyr Heights Drive.

Another section of the crew spent four hours finishing cleanup on Hillcrest-Alma easement. Erik Beyer and I went over all of the Zephyr Heights area checking places needing erosion control. I also spent some time with Carlos checking measurements he

had taken on Canyon Drive to locate proper position for a water company valve which had to be replaced.

The four riprap sections totaled seventy feet in length, which is the pay item. Widths of a riprap section are not measured except in special areas. On the service line trenches, the widths are just sufficient to cover the trench area, which usually is no more than eighteen inches wide, sometimes two feet. It will depend upon how tough the digging is. If there are boulders present, the trench naturally is quite wide at those points.

Monday, November eighteenth, was a cloudy, cold day; nevertheless, Carlos's crew of one operating engineer, one truck driver, and six laborers accomplished a good day's work. The truck was used part-time to haul rock for riprap, which was said to come from Carson Valley. Local rocks usually are partly decomposed granitic fragments, and they are somewhat unsound and break up too badly in alternate freezing and thawing.

The operator on the loader used his machine to carry a rock supply and hold it at the higher elevations on the riprap sections. Areas worked were parts of Zephyr Heights and North Martin Drive. Five three-inch-by-twelve-inch redwood erosion checks were placed on two easements. Sixty-four feet was the total length of the redwood checks. Riprap was placed on seven lots and in two places immediately above manholes B-27 and B-28, total length being 150 feet.

Property owners Fenwick and the owners of lots on the easement above manhole 24-5 were present with complaints, Fenwick complaining of a hole in the trench at Sleepy Hollow which was to be filled anyway, later in the day. The other man was trying to get something for free, relating to a work road built over the upper part of the pipeline on an easement. I suggested he see Erik.

The following day, Tuesday, November nineteenth, the crew succeeded in placing three redwood erosion checks and riprap protection on ten lots. It was necessary to find a supply of suitable rock locally in the morning, and only a small supply was found. Just after lunchtime, however, a truckload of rock arrived from the Minden area.

Mr. Fenwick was on the job with another complaint. The hole in the trench below his house was being filled, but his new complaint was that his rock garden on benches above was demolished. The laborers did not have enough soil after filling the hole to take care of the bench. The repair would be done, but he would have to wait 'till Johnson's Caterpillartype backhoe was available to haul in the soil.

Wednesday, November twentieth, was what might be called a banner day with respect to what was accomplished. Good weather—a warm, sunny morning followed by a partly cloudy afternoon—probably had a lot to do with it. Adding two more trucks also helped. Today all rock was hauled by the three trucks from the Dayton pit. Riprap crews were three in number, and there was plenty of sound rock for everyone.

The rock was dumped near the areas needing protection. Riprap was laid on sixteen of the four-inch service line trenches on the banks just below the property lines. A total of 236 lineal feet was laid. Carlos Archuleta's men were divided into three groups; and work was done on South Martin, Inspiration Drive, Point Road, and on an easement at a steep area just above South Martin and below manhole B-10. Two of the lots served were apparently overlooked on the original planned lists. I added them after going over the ground.

Thursday was a different day weatherwise. Rain and snow became unbearably cold for some of the workmen who were not

protected by rubber clothing, and work was discontinued at noon. I had my rubber hat, coat, and pants in the car at all times to cope with weather like this. I also wear insulated boots and thermal underwear and had a heavily lined and furhooded Alaskan coat. Only six lots, three on Lookout Road and two on Don Drive, had been given riprap treatment.

Friday was cold and cloudy, and the roads were icy from rain and snow, and the subdivision roads were very slippery. These roads were not negotiable even with snow tires until late afternoon. Most of us had chains, but no one wanted to bother with putting them on. All the workmen left cars at the bottom of the grade, and I did the same with mine. The crew was one man short, the weather unpleasant, and the stones used for riprap were slippery with ice in the morning and with mud in the afternoon—all of which slowed production. Nevertheless, the workmanship was of good, acceptable quality.

Slopes on eleven service line areas were protected by riprap. Steep places on four of the lots on easements were protected by carefully laid riprap in place of redwood planking. Total length of the riprap strips amounted to 183-1/2 feet. All of this day's work was confined to Zephyr Heights and Zephyr Knolls. That Zephyr Knolls area, by the way, was a very steep, rough area; but it seems some of the people like those steep, rough areas as long as they can build a house there which shows a good, large part of Lake Tahoe.

Ice on the main highway caused a small car to completely turn over just below Marla Bay. Police were present and apparently had traffic under control. This was about onethirty P.M. I had no information about passenger injuries.

Monday, November twenty-fifth, was another cold day with icy roads. These hillside

roads were so slippery in some places, they were either in part impassable or nearly so. Access to Logan Creek Estates was attempted and given up.

Most of the erosion protection this date was at designated places marked by Erik Beyer and me a few days earlier when we had made examination of the area. A change was necessary on Jerry Drive easement, where a rodhole had to be raised two feet because of placing a riprap at that point. A two-foot section of the six-inch main was required.

Again work was slowed by icy hillside roads. Nevertheless, riprap was placed on banks where service lines were placed to seven lots and on a disturbed bank near a garage corner on Jerry Drive, where a crew five months previously had left this particular area in bad shape. Water had been running toward the paved street from drainage above. Full protection was given by excavating a drain ditch between the garage and the fence. Large stones were placed along the south bank of the drain ditch and the rodhole raised two feet, as explained above, because five feet of riprap had to be placed at that point. Another seven feet of riprap had to be placed along the trench on the east end from the level of the yard to the rodhole. The riprap protection was scattered, being placed on two courts— Beverly and Wren, two streets, and one easement.

Tuesday, the twenty-sixth, was a mild and clear day, and access to all working areas was satisfactory. The crew members were pretty much scattered and work was done on an easement off Wren Avenue and on Robin Circle, on the Cave Rock Estates, on Logan Creek Drive, and on Zephyr Heights at North Martin.

In the morning, I started with the crew on an easement at a point where an eighteen-inch corrugated metal pipe outlet had been placed. This area was supposed to be studied by

Superintendent Leo Tuccori and Erik Beyer, but this had not been done. Carlos had his men there and was all ready to begin. I told him to go ahead with riprap, and I would go to the office, which I did, but I did not find Erik until later in the day.

In the meantime, Carlos and I placed the protection in the approximate place, and that particular job was finished by ten-thirty. Grouting probably would be required later at this place where water empties directly on the riprap.

Other members of Carlos's crew were cleaning mud from curb areas ahead of the concrete patching and curbing crew, which was being checked by inspector Vic Clyde. The small crew headed by Carlos laid other riprap protection: one on Logan Creek Drive, one on a circle in the area, another one on Wren easement in the Cave Rock area, and one more at North Martin and Zephyr Heights.

Wednesday, November twenty-seventh, was again mild but partly cloudy. Carlos Archuleta's crew consisted of one operator of a Michigan loader, one truck driver, and six laborers. There was only one pay item, thirty-seven feet of riprap erosion protection on Canyon Drive for Lot 94. Workmen were busy all day, however, with miscellaneous tasks, gathering unused pipe lengths from scattered places and hauling them to central storage. They also picked up rubbish, painted damaged trees, and cut felled trees into lengths which could be hauled away.

I left the job at noon, as Mrs. Little and I were to spend the Thanksgiving holiday at Stockton, California with two of our daughters and their families.

There was no more work on the project 'till Monday, December second, as all the Byars crew members were given a two-day holiday.

The next workday was Monday, December second. And the first remark in my diary report sheet stated that "time and materials" sheets had been made out and would be submitted later. All work done this date had to do with a change on Maria Lane, extending a rodhole 109 feet beyond where it had been originally placed. This was done to provide a four-inch service line to a portion of Lot Number 8, which the owner had divided into two lots. The new lot was referred to by me as Lot Number 8-A. This change also required changing the location of the service line for Lot Number 3. This extra work had to be accounted for as time and materials to be paid by the owners of the lots where changes were made. I suggested that eighty percent of such changes be against Lot Number 8-A and twenty percent against Lot Number 3.

The materials used were: 109 feet of six-inch gravity main; nine feet of four-inch service line to Lot 3; twelve feet of four-inch service line to Lot 8-A; two wyes, one to each lot; and one rodhole. Labor and equipment would require eight hours each for one foreman, one operating engineer, two pipe layers, and three laborers. Eight hours would also be charged for each piece of equipment, some not used fulltime. Besides, this would include one small backhoe, one Michigan loader, one small compressor with spade and hammer, one whacker, and one Ford pickup. The inspector's job in these extra work orders is to keep records of time, labor, and equipment. The unit prices are not necessarily known to him, as that is the job of the office force.

Tuesday, December third, was cool, cloudy, with some rain. The crew directed by Carlos Archuleta was smaller on this odds-and-ends work than it was on the normal construction projects. One work item this date was thirty feet of riprap erosion

protection which furnished the project started earlier on Wren Avenue in the Cave Rock area.

Work items were scattered over the entire project, many of them completing small items which the contractor's crew had purposely deferred during regular construction. Erik Beyer was busy making up the punch list in a systematic manner, going from one end of the entire project to the other. (The term "punch list" I probably have mentioned or explained before, but it refers to all the unfinished items, many of which were unintentionally missed, and some of which required special parts or special protection which was not attended to during regular construction.)

One of the last projects in the sewer line construction is the raising of all manholes and rodholes which have been placed under paved roads. The metal cover openings must be as nearly as possible at the exact surface to insure smooth riding for traffic. Usually one special crew is assigned to this work to cover the entire project. One of the inspectors is assigned to accompany such a crew. On easements, the metal covers do not have to be exactly at the surface. They usually are left slightly above the surface; thus the manholes and rodholes are completely in view.

Returning to the workday, December third, another item was the laying of four-inch service line above the old Lincoln Highway to a certain lot. Excavation and grading this case was done by hand labor. Hand labor usually always takes more time, but in some places it is not possible to do it any other way—because of presence of trees and other obstructions, equipment cannot be gotten into the place.

A "time and materials" list was made by Carlos Archuleta for the repair of broken copper water pipe. I observed a patching crew under Foreman Cal Jones from ten o'clock in the morning 'till noon. This crew had a truckload of hot asphaltic paving and

a Ray-Go vibratory compactor. The crew did pavement patching in the area disturbed by Carlos's crew yesterday. An eroded area next to a rock wall was filled with hot asphaltic mix and compacted. The lower part of the Foothill Drive below the old Lincoln Highway and leading to a boat landing also received considerable patching. I did not report time and material on Cal's crew.

December third, no doubt, had turned to snow; and work was called off for Wednesday, December fourth. The contractor probably had a better weather report than I had, because on Wednesday, the fourth, I was all ready to go when my phone rang and told me there was no work.

I separated my report for December fifth into two sections, Number 254-A and 254-B. This report goes into detail on the "time and material" method of making payment to the contractor. Rather than reciting these details into a tape recorder with the expectancy that a typist would be able to readily display them in organized manner, I believe it would be better to actually use the reports as they were originally made out. As many as needed could be made on a duplicating machine. I believe it would be desirable for future researchers to surely see what an inspector's report and report form looks like—twentieth-century style! [Laughs] The reports show actual names of people involved these two days, the hours they worked on certain projects, their titles; and they also show kinds of equipment and hours spent in their use. Kinds and quantities of material also are shown.

The inspector does not have a record of the pay rates. The contractor usually receives, in a time and materials method of compensation, his actual cost plus a percentage, which is usually fifteen percent. The percentage helps to defer his travel time, clerical and top executive salaries, insurance, and equipment

repair. There usually is a plus balance left over, which is his profit.

These three sheets to which I referred are carbon copies of the originals. Hopefully, they are sufficiently legible to secure readable duplications. Fortunately, at the particular time they were written the carbon paper was of very good quality; and I hand printed the information, which makes it fairly legible. Had it been in my scarcely legible handwriting, it would not have been usable!*

Friday, December sixth, was a good day to work, as it was fairly warm, although partly cloudy. Icy grades during the first three hours in the morning were, however, slick enough to require help of the loader with chains on to hold the backhoe in position while excavating.

Erik Bayer was on the job by eight-fifteen and affixed the point at which to start the third four-inch pressure pipe. Two pressure lines were laid this date for combined lengths of 176 feet. This was all that could be laid, as there was no more four-inch pressure line available on the job in the working areas or in storage areas. Carlos was not on the job until noon, and at that time stated that more pipe would be delivered to the job Monday, December ninth.

Balance of the working day was spent on backfill compaction and excavating for Monday's continuation of pipe laying. Digging was fairly easy after the first three hours when it was no longer necessary to chain the backhoe to the loader. Workmen were admonished to watch very carefully for water lines; but the relatively shallow excavation for the pressure lines, which was only three and a half feet, apparently was not deep enough to intercept them—thankfully! [Laughs] A road in the area,

*See Little papers, UNR Library

although not in use at this time of year, was nevertheless barricaded and equipped with flashers for the sake of safety. Record of time and materials was kept, but I will not repeat the information.

Monday was a rather mild day, partly cloudy, and a good working day. It was the ninth day of December, which happened to be my seventy-third birthday. Joe Krmpotic was back on the job. Apparently he had been on another assignment for the Byars Construction Company. He and Carlos were gone from the job site for some time in the morning hours and returned with some parts relating to the work. Apparently they had been scrounging storage areas for these parts, but they could find no more four-inch, Class 150 pressure pipe. (I have not explained yet about the difference between four-inch pressure pipe and four-inch service line pipe. The pressure pipe weighs probably a little more than twice as much per linear foot as the nonpressure pipe, and the walls are much thicker—and they have to be to withstand the pressure.)

The work plan for today had been to complete work on the Cave Rock Estates area by finishing the laying of the pressure line started last week. Pipe had been ordered, but since it was not available, the crew was moved to Lakeridge where trenching was begun for the same kind of line there. Frozen ground under the pavement made the going tough. A compressor was busy all day cutting pavement and frozen ground. This was slow work. But the backhoe was able to finish most of the trench by four-thirty P.M.

Some of the laborers were taken from this project to help with the concrete and cleanup work under Don Collins's supervision at Marla Bay and Zephyr Cove.

The only material placed by Krmpotic and Archuleta's crew was one six-inch to four-inch

cast-iron elbow and saddle. I divided my time between the two crews. Collins's crew poured two concrete extensions in Marla Bay. One was a ten-foot-by-fifty-foot slab, six inches thick, leading from the paved road to a pump station; and the other was a concrete slab, eight feet by twenty feet, six inches thick, leading from an eightfoot-wide easement on a water intake area to the lakeshore.

These concrete slabs were necessary to direct flow of drainage water to the Lake, thus preventing undue erosion.

The concrete was finished just at noon, and by three P.M. initial set had taken place. Visqueen cover with sufficientsand cover over the top were placed to prevent freezing. Collins's crew did an expert job. Both Erik and I observed portions of this work.

John Glenn, Marla Bay caretaker, was on hand during pour and covering operations. Incline Village Gravel Mix supplied the concrete, which was made from lightweight aggregate and Nevada Cement, all state Highway Department-approved materials.

Don Collins's crew did some cleanup work along the beach area by hand. The loader could not be used because its weight left deep holes in the sand. It had been tried and given up. Crew and equipment time and material records were kept by me for both crews, but I shall not repeat them.

On Tuesday, December tenth, I spent the entire day with Krmpotic and Archuleta and their crew on the Cave Rock Estates area, laying 418 feet of the four-inch pressure line, which was hauled to the job site yesterday. Accessories to the pressure line included four cast-iron forty-five-degree angles, one sixty-degree and one ninety-degree angle, and four cast-iron plugs. This was all a time and materials day, and the eight man crew worked a full eight-hour shift. Equipment included the backhoe, a loader, flatrack truck,

a whacker, and compressor with hammer. Weather was mild.

The crew was short about three men, as that many were sent to other projects, such as cleanup and correcting items on Erik's punch list. Krmpotic spent some time with Don Collins. Erik was on the job for a short time and asked me to go with the Don Collins crew tomorrow on the punch list work.

Wednesday, the eleventh, was cloudy all day, giving us some small amount of rain in the afternoon. The punch list sheets used by Collins this date were all on the Skyland area, and the entire day was spent making minor changes and repairs where noted on the list and attempting to locate missing service line markers at the property lines. All service stakes on Golden Mantle and on Sheet 10 of the Skyland project were found, except one for Lot Number 217. The stake for this lot was somewhere obscured under a lumber pile used in building a home on the lot.

One item entitled "repair fence" on Plan Sheet Number 12 was not done, as the wormholed cedar posts were unable to hold the nails. The contractor did not build a fence in the first place and had not disturbed it; therefore, I had the item canceled.

Some of the punch list items referred to patching holes in the pavement. These repairs would have to wait until we could get enough of them in order that a full truckload of hot asphalt mix could be used to make all the repairs in a single day.

There was intermittent rain most of Thursday, December twelfth. Work continued in the rain, as everyone had waterproof clothing for use when necessary. There were three foremen—Joe Krmpotic, Don Collins, and Calvin Jones. Carlos Archuleta, assistant foreman, was also present. Counting the four bosses, there was a total of only eleven crewmen; but all hands, including

the foremen, used hand tools on cleanup, patching, and repair. I myself didn't object to picking up a Number Two shovel—shoveled when there was an emergency or need, and I know it was appreciated.

Workmen and foremen were split up into small crews and worked on punch lists on Lakeridge, Skyland, and Cave Rock Estates. A good part of my time was spent in traveling from one place to another.

A truckload of asphalt paving arrived in mid-morning, and Cal Jones with a three-man crew took care of the patching. This crew had the holes and gashes in the pavement thoroughly cleaned before the asphalt arrived. They finished the Cave Rock Estates patching by noon and the Lakeridge patching by about one-fortyfive. I had measurements of the patching and would get with Cal Jones Friday to assemble the time and material report for this day's work.

I spent most of the afternoon with Don Collins and Carlos along U.S. 50 and with Joe Krmpotic present there part of the time. Erik Beyer was on Lakeridge to assist in locating service markers. We could have used Vic Clyde's notes, but he and his wife had gone to Oregon; and his notes were at home. Vic apparently was through in the district as an inspector. By day's end we had located all but four markers on Lakeridge. I found places along U.S. Highway 50 where the power company had points marked for new power poles and anchors directly over the sewer main. I called Erik's attention to this for immediate correction.

All the punch list items on Skyland were finished by eleven AM. except for asphalt patching and one fence repair—and, of course, location of the service marker under the lumber pile on Lot 217. I don't remember now when that was found, if ever, during the time I was up there [laughs].

Friday, the thirteenth, was a mild, partly cloudy day. The same four bosses, and this day, nine laborers and operators comprised the total working force. The crews were scattered. At times there were three and sometimes four separate crews. Work was done on the beach areas, on both upper and lower Lakeridge, on Alma, and along U.S. 50. Carlos cleaned up the punch list on Alma easement, clearing brush and barbed wire and rebuilding a fence using partly new materials. Cal Jones put in water breaks and did some patching on lower Lakeridge. Joe Krmptotic with Hobbs on the backhoe cleaned up along U.S. 50 and supervised cleanup at the yard. Don Collins had the Case backhoe operator and also Hobbs part of the time, and they took care of upper Lakeridge and spent some time in the vicinity of Dudley Kline's place. Dudley, by the way, was my chief tester in the asphalt section of the materials laboratory and is still there at the present time, 1977.

While working on Zephyr Heights several weeks back, a boulder had to be blasted in the street next to Bob Sharp's residence. The blast had cracked a portion of Bob's rock wall, and a large boulder was dislodged from the hillside and had rolled down into Bob's yard, fortunately not doing much damage. Bob, by the way, was one of the chief designers in the state Highway Department.

Joe and Carlos, together, replaced parts and patched others on Sharp's [laughing] rock wall. They also had the powderman drill and carefully blast the boulder, which was then entirely removed from the premises.

Cal Jones spent his time with a crew on Kingsbury. Erik Beyer spent most of the day with Merl Sawyer finishing the punch list on Cave Rock Estates. I traveled here and there and tried to keep up with as many operations as possible but at times had trouble in locating a particular crew. Before the punch list could

be taken care of in Lincoln Park and on lower Lakeridge, Vic Clyde's notes would be needed.

Monday, December sixteenth, was a good day weatherwise, as temperatures moderated and the sky was showing but a few clouds. I had a rather unique experience to start the day. I arrived at a point on U.S. 50 below Lakeridge just before eight o'clock to try to locate from my notes the position of the marker for Lot F. I was driving slowly to make sure I would not pass the marker without seeing it. As I was sauntering along slowly, two traffic cops stopped to look me over and found out why I was driving in this manner. They also asked to see my driver's license and any other identification I could produce. I told them what I was doing; they seemed doubtful, so I showed them my professional engineer's card and told them my reasons for driving so slowly. This apparently satisfied them, and they left [laughs].

Today's makeup of the personnel was the same as last Friday, but work areas were different, except upper and lower Lakeridge. Dudley Kline's beach area, Hillcrest, North Martin, Logan Creek Estates, all received punch list attention.

I visited Dudley Kline's beach area where Don Collins and crew were assembling rocks to rebuild steps to the beach. I then accompanied Erik Beyer and Joe Krmptotic for a time in search for appropriate areas where U.S. Forest Service markers could be placed without damage to sewer lines. I also observed backfill of trench on Hillcrest easement above the pumping station and cleanup in the same area, after which I accompanied Carlos and Hobbs to check a place where the property owner of several lots adjoining the North Martin easement had insisted that a manhole in the easement was projecting out of the ground and was unsightly. There was only one way to correct that: the work crews

placed more fill around the manhole and for quite a little area on each side so that rain water wouldn't wash away too much of it. Three of us then decided what was done was good enough, and that, I presume, satisfied the complainer.

A real estate agent by name of Bledsoe also complained; he hadn't liked the color of mortar used in repairing a brick wall. He also insisted that the contractor thoroughly patch all bad places in the pavement. Joe and Carlos showed him places where the contractor would place patches, which were limited to ruts made by the contractor. Anything else would be at his—Bledsoe's—expense. He was just another man trying to get a little something extra for nothing.

In the afternoon I went back to the Dudley Kline steps project, which was finished; and after securing a copy of the punch list from Lorrie, covering the Logan Creek Estates, I accompanied Don Collins and crew to that area. We found everything had been finished. Apparently another crew had been there with the punch list and had attended to manhole and rodhole irregularities and had corrected all other items.

On Tuesday the entire personnel count was the same as on Monday. There were only two work crews, however. Cal Jones had part of the workmen on the asphalt patching crew, and all the other Byars employees composed a second crew.

The latter crew spent the entire day on the Presbyterian Conference grounds with Bill Short, the caretaker. They were working on a list of forty-three items on the punch list for the Conference grounds. This list consisted of cleanup, moving rock and boulders from one place to another, clearing dead brush, leveling lawn and parking areas, backfilling holes and space around the pumping station, and clearing debris from

fences between the Conference grounds and Marla Bay. Electricians from Barker and Barker Company, Reno, were present for a while attempting to complete wiring for the pump station. They could not finish 'till a broken conduit was replaced with help from a backhoe. The Conference grounds punch list was not finished until Wednesday afternoon.

Cal's crew finished placing asphaltic drain trenches at Lakeside and put in a special patch near the California state line. They went to areas on Alma Drive and filled in holes in the pavement, then built up with blacktop over the intersection of Suderberg's driveway and the street, which reduced a rather sharp vertical angle which was causing tail pipes to drag.

Erik Beyer was busy all day on Zephyr Heights and North Martin checking completed work there.

Wednesday cooled off, and there was more cloudiness. The sane personnel and equipment continued in the same areas, plus Marla Bay and Cave Rock Estates. Cal Jones with his paving crew was in several places. Cal did not have a paving machine. All material was hand-laid, raked, and rolled with a small hand roller. This was the best way to do asphalt patching. In Marla Bay his crew did manage to hand-lay a strip about two hundred feet long and nearly twenty feet wide along a stone fence.

Erik and I visited Cave Rock Cove in response to a phone call from Leo Tuccori, the contractor's superintendent. We conferred with a Mr. Johnson and saw where patching was needed. In fact, the approach road from U.S. 50 should have been paved by Nevada Paving when they were there. They had all the equipment; they had the time—and now it was not possible to do that kind of paving. The patching crew of Cal's was not equipped to handle it.

All the other crewmen and foremen as well were at work most of the day on the Conference grounds. They finished all the cleanup, placed boulders where the caretaker had designated them, and built a grouted, hand-laid wall just below the pump house. All punch work—this punch list work—on the Conference grounds except a few details was finished by quitting time.

Word was given by Joe Krmpotic that work would continue through December twenty-fourth, again on the twenty-sixth, and as much longer as required to finish the job.

On Thursday, December nineteenth, the same work crews were again present. Cal Jones and his crew spent most of the morning preparing areas for patching. In the afternoon his crew placed hot asphaltic mix in Cave Rock cove. Nine patches, some of them of considerable size, were placed in the afternoon.

Don Collins and crew spent the first three hours on Beach Lane in Marla Bay on Mrs. Bogle's property, then went to the Cave Rock Estates area where they joined Joe Krmpotic and Carlos Archuleta. The two crews worked in separate areas of Cave Rock Estates in the afternoon.

In the middle of the afternoon Joe's crew worked portions of unfinished punch list on Zephyr Knolls and on U.S. 50. Bill Short, the Conference grounds caretaker, gave his okay to all items on the punch list for that area.

Vic Clyde would be present tomorrow afternoon to give directions for finding service markers on jobs he inspected. I attended the district party in Erik's and Lorrie's office at five P.M.—dirty work clothes and all! It was a good party with plenty of food and refreshments.

Friday, December twentieth, was a rather cool day but not sufficiently so to slow production. Total work force, including

the four foremen, was fifteen. Equipment included one Michigan loader, two backhoes (one a Michigan and another a Case), two ten-wheeler trucks (one a dump truck and the other transporting the asphalt paving mix), one small roller, one Bo-Mag compacter, and a compressor with spade.

Krmpotic, Archuleta, and Collins with three crew members spent all morning trying to finish Zephyr Knolls. Riprap protection was given on one of the easements above manhole B-35-3. Redwood was not used on this easement, as it was almost entirely rock and boulders.

Cal Jones with his pavement patching crew finished his punch list items on Cave Rock Estates, then went elsewhere; but I was unable to check his crew, as Vic Clyde came up at noon and went over the Cave Rock area with me and with Don Collins. We marked all the areas to be corrected.

Vic accompanied Don Collins and others, including a backhoe operator, on the Lincoln Park and lower Lakeridge areas. With Vic and his notes helping, all service markers but two were found. Two parcels at a boundary line could not be—markers for those could not be found, as this area had been seeded to grass. Vic said his notes could be used to find the service lines if it was necessary in the future. We had decided it would be poor policy to disturb the seeded banks at this time.

We were not through with Vic at four-thirty, which was quitting time. Vic would come back Saturday and re-search areas where he was the inspector on the lower Zephyr Knolls, Snug Harbor, and other places where the markers were destroyed. He would make notes and leave them with me Sunday morning in Carson City.

Joe and Carlos spent most of the afternoon digging up some pipe sections along U.S. 50 in front of Skyland which were slightly out of

grade, and relaid them so there would be no question about them functioning properly.

Some of the items placed during the past several days were pay items and must be separated from the time and materials list. The latter I will not describe; but the pay items were the following: December eighteenth, three erosion checks (redwood) on the Presbyterian grounds; December nineteenth, twelve monuments put in by Summerhill and observed by Erik Beyer; December nineteenth, three erosion checks on Cave Rock Estates; December twentieth, three erosion checks on Zephyr Knolls; December twentieth, thirteen feet of erosion control (that is, riprap) on Zephyr Knolls above manhole 35-3. Measurements of the redwood erosion checks would be furnished to the office; I did not report the lengths here.

Erik Beyer would take off a few days next week, and he assigned me to take care of operations in his absence.

* * * * *

I had intended to get something of the life stories of the chief foreman in the crews I watched up at the Lake and the assistant. The chief foreman up there was Joe Krmpotic, and his very efficient assistant was Carlos Archuleta. Carlos with his wife and two cute little children did come over on Sunday, May the twenty-second, and this is what he told me about himself. Of course, I became pretty well acquainted with these two foremen as well as quite a few other workmen, foremen, and so forth while I was working up at the Lake; and I noticed they were both very efficient and seemed very well adapted to handling men.

Joe had handled crews which I had inspected up at the north end of the Lake, but I noticed in the last few years he had mellowed quite a lot. I saw him up on the north end—

fired the entire labor crew one time and also one of the backhoe operators—all in one big batch. But his peers knew he was a good man and that he was doing that for their benefit, and he didn't make any apology for it. It was just—he saw it was the thing to do. But I noticed in this job he let Carlos take charge of a lot of it; sometimes they split crews. And Joe was much more amenable, I thought, with his men. But Carlos tells me that Joe was always very good to good workmen. He himself would buy beer for after working hours in the hot summer, and they would all have a little beer bust and that kind of thing.

But Carlos drove over in his brand new pickup, and introduced his wife and the two little children—little boy, five, and a little girl, two—they were just cute as could be and well, well behaved.

Carlos was born in Ely, Nevada March 25, 1947. His mother was a Shoshone Indian, and his father a Mexican. Carlos attended grade school in Ely, then White Pine High School. He helped earn his way, beginning as a seven-year-old when he shined shoes and had a paper route. At age twelve he went to work parttime at Pete's Drive-In in Ely. This was a hot dog and hamburger place. He continued work there at least part-time; and when he was a junior in high school, he was made manager of the place. While in high school, he nevertheless found some time to play basketball, baseball, and some football in the proper seasons.

Immediately after Carlos graduated, he was employed at the copper smelter in McGill as a mechanical puncher on the converter; that was in the furnace work. This job was interrupted by Carlos being drafted into the Army. He completed his basic training at Fort Sill, then was sent to Germany. He served in Germany 'till he was ordered to Vietnam in 1967. He served in Vietnam thirteen months

and left the service as a sergeant and came to Reno.

He worked for his uncle, George Archuleta, who took him to Hawthorne, Nevada where Carlos helped his uncle build homes at the base. In 1969, he came back to Reno and was employed by the Byars Construction Company. He worked as a laborer at first, then was soon advanced to pipe layer. He also ran equipment for Byars, and in 1972, he qualified as an assistant foreman. It seems the contractors require all foremen to learn how to operate the principal equipment as well as know what they're doing, reading the plans, and on the job. And that was on the requirements before Carlos could become an assistant foreman, which he was.

He worked on numerous projects for Byars in the period of 1969 to early 1977. He was assistant foreman on one of the crews and at times acted as foreman on the five-million-dollar sewer job from Round Hill to Glenbrook at Lake Tahoe. It was on the job that I became acquainted with him and found him to be very proficient in his direction of laborers and equipment operators. He worked with Joe Krmpotic, who was head foreman. At times the crew of twelve to eighteen men was divided into two sections, with Carlos in charge of one of them.

He also had the job of repairing all broken water lines, which were numerous, especially on Skyland and on the Lakeridge subdivisions. He was expert at this job, in which there were in excess of sixty-five breaks with the Archuleta-Krmpotic crews.

Early in 1977, the Byars Company had financial trouble and laid off a great number of their employees. Carlos said, "You know, they started out by laying off their best men." And he says, "What they have left, I wouldn't want to work with that kind of crew. They're

reducing everything; they sold most of their heavy equipment."

Carlos left them and secured work with the Helms Construction Company, where he is now qualified as foreman and probably will soon be placed as a foreman.

On September 11, 1971, he married Catherine Landa of Reno. They now have in 1977 two children—a boy, five, and a girl, two and a half—and as I have already stated, they are well disciplined. Mrs. Little took the kids over with Mrs. Archuleta, and they can actually play cards and seem to have a lot of fun at it. And Mrs. Little remarked how well behaved they were.

Carlos and Catherine had just sold their home in Sparks, which is at 1125 Tyler, and they had a new home being built in a new subdivision between Reno and Stead Air Base. There's an acre of land in their new place, and they're trying to buy an additional acre. Catherine is an experienced horsewoman and enters riding contests, such as barrel racing and so forth. There are two horses that'll be kept at their new home.

I admired Carlos very much as a workman and foreman. He was honest in his decisions, and he always tried to do the best kind of job possible. He's ambitious, and he's brilliant. The fact that he's part Indian and part Mexican has nothing whatever to do with any retardation or any slouching or anything like that. He's really a top hand, and I think he's saved his money and has done a good job.

I will try to get hold of Joe Krmpotic a little later and get his autobiography and place here, although it will pass on beyond this.

* * * * *

I was now going to discuss the last eight days which I spent on the Round Hill to Glenbrook job. The first four of these days

were all spent with the crews on the punch lists, and the last four of the days the crews were gone, and I stayed in Erik's office and worked on the "as built" notes which were placed on the plans.

There were two days' work before Christmas 1974, the twenty-third and twenty-fourth. The punch lists included work on Cave Rock Cove, Cave Rock Estates, Zephyr Knolls, Zephyr Heights, and Snug Harbor—at least on the first of these two days. We had quite a few foremen in addition to the crew. There was Joe Krmpotic, Don Collins, Cal Jones, and Carlos as foremen; and two operating engineers; one and sometimes two truck drivers; and seven laborers. All of this work was "time and materials," as so much of the last work at the end of the job is classified—that is, when you're cleaning up and so forth, that's the only way you can get a pay to the contractors, time and materials plus a percentage which, as I have said before, is fifteen percent.

The equipment was somewhat less than usually used. There was at least one loader, one backhoe, and at least one truck. And a compressor was kept on standby in case a boulder had been missed somewhere where the job was not quite finished and would have to be drilled and blasted.

Victor Clyde left me his plans and field book and a set of notes, the latter referring especially to areas where service markers had not yet been found. Vic worked most of Saturday, December twenty-first and about a half of the day, Sunday, December twenty-second, getting his material together. He also set out stakes on Saturday, marking certain areas.

On Monday morning, Don Collins used Vic's material to begin work with Bob Hobbs, an expert backhoe operator, at Cave Rock Village subdivision and at the lower end of Zephyr Knolls. By four-thirty in the afternoon

all the Cave Rock Village markers were found but one, which was buried in a frozen pile of dirt [chuckles]. Digging was extremely tough because [of] shady places frozen over a foot deep. This one area had been excavated for a basement, and the owner had piled dirt next to the road. Vic's notes will, of course, be available to find the marker when necessary, but the owner no doubt knows where it is because he was the man that covered it over.

Zephyr Knolls markers were found also, and Vic had marked the place where the marker was to be placed on Lot Number 3 on a Cave Rock Estates easement. Carlos and Joe—they had a crew on Zephyr Heights, and items on the five of the sheets Erik handed out were pretty well cleared. Places needing asphalt patching may have to wait 'till next spring. It was too cold at present to satisfactorily handle asphalt mix.

Cal Jones spent the day in cleanups in several places, and he finished all the Cave Rock Cove area. In Lorrie's absence, the lady in the real estate office next door helped me make copies of some of the punch sheets. She could get into the office through a side door which is bolted on her side. Erik, of course, was gone a few days at this time and I was left to kind of handle things while he was gone,

The next day, the day before Christmas, we had rather mild weather, but it was cold enough in the shade and partly cloudy. We had just about the same crew we had the day before, but the working time was cut to seven hours on account of it being Christmas Eve. Working time was from eight A.M. to three-thirty P.M. And the manager, of course, that we have had on this job all the time was Leo Tuccori. But Leo was absent this date, and Paul Franklin, the assistant manager, was in charge of all the foremen and men. And we had the same foremen as yesterday, and I think about the same crew

except one laborer short, and we had about the same equipment. Emphasis was placed on an attempt to finish Zephyr Heights today and to complete Zephyr Cove. These were the only two projects they were to work on this date.

The crew with Cal Jones had at least two laborers and occasionally another one, and they finished the Zephyr Cove area with occasional help from a loader and a backhoe; and they were aided at three o'clock by Carlos and his crew. I went with Cal in the late afternoon and checked every item with him on Zephyr Cove, and I found everything complete except some asphalt paving items. These items, Numbers 30, 33, and 35 on page 111 of the plans, were marked; and items marked there, 14-C and 16 especially, cannot or should not [be] attempted 'till spring on account of the real bad weather and cold, frozen ground. Two grass replacements also will have to wait 'till spring.

Work on Zephyr Heights was done by Carlos's and Don Collins's crew with Joe Krmpotic as coordinator. I tried to follow the crews as closely as possible and had checked most of the items but will need to take another look at some of them. Needless to say, the paving and patching items probably will not get done until spring. I omitted several of the redwood erosion controls; I did this purposely because in some cases it was almost impossible to dig by hand on account of deep freezing of soil, especially in shady places. Backhoe digging was also out of the question. Some of these places designated on the plans will not require the redwood erosion protection because, to my opinion, at least, there was enough rock and sufficient compaction to hold without the redwood, especially where the disturbed area is not likely to become a water course [chuckles] during runoff season.

Crews were taken off at three-thirty, and everyone was invited to a cocktail party at Byars's office. This was put on by the contractor. I didn't bother to attend that one because I wanted to go home as soon as possible on Christmas Eve.

Christmas Day, as I recall, was spent home by Ruth and me. I don't recall that we had any visitors. The fact that I was working Christmas Eve and working again the day after Christmas didn't give us much time for family affairs.

On December twenty-sixth, we were working punch lists on an area called "Area D," and on one called Cedarbrook, and in part of the Glenbrook area. Again we had Krmpotic, Collins, Jones, and Archuleta as foremen; and we had three operating engineers, two truck drivers, and six laborers. All hands were supposed to work on the Glenbrook area this date, but most of the morning and part of the afternoon was spent on Cedarbrook and Area 0. Don Collins spent the entire day with work on Area D and some cleanup along U.S. 50. Cal Jones finished Cedarbrook about two P.M., and I spent part of my time in that area.

The Cedarbrook punch list is as nearly complete as it can be at this time. The paving items, of course, and the drain ditch on the south end of Logan Shoals will have to wait 'till spring. Frozen ground on the Logan Shoals end was too tough to make a satisfactory drain trench.

Don Collins secured Vic Clyde's notes in order to finish Area D, but I do not know at present time—that is, late December 1974—just how much progress he made. Joe Krmpotic acted as chief foreman and also operated the loader part-time. All crews except that of Collins spent up 'till six o'clock in the evening in the Glenbrook area. One crew had been there all afternoon and part

of the morning. Men Sawyer, who was the inspector there, was present at Glenbrook all day and gave instructions where to dig for service markers. Erik was back on the job and spent some time at Glenbrook also. Cleanup seemed to progress quite well except where ground was badly frozen. Digging in shady places was simply too tough in most cases. Ground was frozen at least a foot in depth.

The swamp area covered on Plan Sheet J-16 will probably be too difficult to finish because of running water which did already run over the top of the trench. The ground was frozen, and the proposed trench area was just loaded with ice.

The last day on the punch list items was December twentyseventh. We had the same foremen, just about the same crew, with only five laborers this date, and the working hours were cut short to some extent. And these crews were scattered. Don Collins apparently was on some cleanup along U.S. 50 and on parts of Areas D and E. Later he helped lay pipe south of Cave Rock in this vicinity of a certain manhole there marked F-9-I. I was not with Don Collins's crew this date, but saw Don on the highway a couple of times.

Cal Jones was in several areas, namely in the Glenbrook and in the area immediately south of Glenbrook in vicinity of the Fleischmann property. Cal did mostly cleanup work but was also assigned to trim a damaged Jeffrey pine at the edge of the lakeshore where a new house was being built just north of [Camp] Galilee and across from the firehouse.

Carlos spent practically all day with the backhoe operated by Bob Hobbs on Glenbrook areas, and in most cases succeeded in finding the redwood markers for services. Areas covered by Carlos were the Yellow Jacket Hill area, the area near the main lodge, and the Slaughterhouse Road area. Merl Sawyer had to be called in to help locate some services in

the late afternoon on Slaughterhouse Road. I was with Merl and Carlos most of the day.

It blew cold air accompanied by snow in late afternoon. Most items on Glenbrook involving sod and swamp and cleanup would have to be deferred until weather warmed up. Service points were all pretty well found and without much trouble. The small backhoe and my car had trouble, though, getting up the Glenbrook hill. It was really nothing but ice and snow. With Carlos's help with his rig, I made it up on the second try. The job was shut down on the north end by three-thirty, and weather was so bad I went home at that time also.

There is a considerable number of items, as I've mentioned several times, especially those having to do with trenching in frozen ground and then laying asphalt paving, which will have to be deferred 'till spring. That was the last day—December twenty-seventh—in which the contractor's men were on the job. They will, of course, have to come back in the spring and do the other cleanups.

I was assigned by Erik to help him in the office for the next four working days, where we prepared the "as built" documents. On the thirtieth of December, which was a Monday, I spent the entire day in the office; and from about the beginning of the day until eleven, I prepared an estimate report covering pay items since the last report in November. We—something I have not stated was that we had a monthly report to make—each of the inspectors—on the pay items. I mentioned the pay items and described them, but I did not show them as they were shown by the month on our reports to the office. Many of these items consisted of erosion control (that is riprap) and small amounts of erosion protection and some miscellaneous items not heretofore reported. The pay items did not include the time and materials projects, as they had been otherwise cared for.

Balance of the day was spent with assisting Erik with completed items from my notes on the Zephyr Knolls and Zephyr Heights areas and from cut sheets and from daily diaries.

The entire work period the following day, December thirtyfirst, was spent on “as built” items obtained from cut sheets, where I did the inspecting, and notes and notations on plans as well as from daily diaries. All of these were covered this day, and often quite a lot of notes and drawings had to be written out on a particular set of plans. Those “as built” sets are kept on files, and are not to be taken out of the office. Continuity of this operation was broken for short periods by business visitors and by phone calls.

Next working day was January 2, 1975. This was a continuation of preparation of “as built” sheets, and I took the entire time, with some interruptions from visitors and telephone calls, and a brief trip to the area along U.S. 50 where the power company was placing a new pole line adjacent to the main sewer line. I have mentioned this before—and the time when they started there, they were actually ready to put it right over the top of the sewer line. I thought I better go back and see how things were going.

Erik and I finished the Skyland area with respect to cut sheet data and services, but all wye locations were not available in my notes and will be obtained later by measurement. I carried small pocket notebooks, and all measurements are in there, and if they’re not on the daily reports, I can always go back and find them. We stayed ’till five-thirty P.M. in order to finish with the data that was available.

The last day of my work on this job—or at least the last day I was paid—was January third. This day was again spent with Erik in attempt to clean up as much as possible construction data for “as built” periods on projects in which I was the inspector. We

cleaned up as much as the data at hand would allow on Lakeridge. A few data were missing on services, and most data on location of wyes also. Several of my notebooks, which as of this date I have not been able to find, presumably carried data which was not recorded on daily diary reports. We also recorded on “as built” sheets all services or most of them on Zephyr Heights and erosion protection and erosion control thus far finished on my areas. I made a special note here which was done a little later—on January fifth I found the six missing notebooks, and much missing data are available there.

During the progress of construction on Skyland and Lakeridge subdivisions, I have stated many times facts relating to broken pipelines, especially the water lines, some gas lines; but the gas lines were not the problem because at least the repair of those was done by the gas company. But all breaks of a water line had to be done with one exception by the contractor. And Mr. Hall, the owner—or at least one of the chief owners of this antediluvian water system [laughs]—did make a point to be present as much of the time as possible, and he was thoroughly dissatisfied with the contractor for breaking pipes in so many places. But there was no way in the world to detect just where those pipes were, even by hand labor. You couldn’t get them with a metal detector because they were ninety-five percent plastic pipe. And from the way they were placed in the road—where the digging was easy, this snakelike line could not help but be intercepted in trenching.

There was one rather critical danger of breaks of a water line, and that had to do with fire protection. Should a water line be broken above a fire plug, and should a fire start there in a residence, time would be lost in getting water from some other source. So one thing I did was to keep a record of the time spent

before the repair was made. Fortunately, there were no fires, but this record does show how much time was lost. Sometimes much time had to be spent in finding where the shutoff was—and the water man knew as little about his line as did the contractor.

So I'm going to read a few excerpts here, but first let me state another reason for making this up in detail. Mr. Hall was so dissatisfied with things that he made some remarks about suing. He was going to sue the district, the contractor, the inspector, and everybody; but I thought I better make some detailed notes—I had them all in a notebook. So I spent two or three days on my own time after this job was done, preparing these notes. And in a little summary I found that I had missed maybe one or two places, but I did have records of forty-three days in which pipes were broken, and the number of breaks totaled sixty-five, and the total time the water was off amounted to 220 hours. All the repairs were made by the contractor; Carlos Archuleta, with an occasional helper, did the work, and he did a good job. I am not going to go over all of these times in detail, but I'm going to read a few excerpts from this note. I will pick up— of all these number of times I'll pick up a few here and there.

The fourth break included shutoff s in April and June. This one happened to be on the twelfth of April. And they were services—two service lines—and they were in the red fir area. And three hours was required before repairs could be made.

Number Ten on June eighteenth: there was a leaking water main along Skyland, and it couldn't be left in that condition, although the leaking was not the fault of the contractor. Nevertheless, the leak was in a steel section of pipe, and it had to be repaired by welding. The water had to be turned off, of course, and that was a four-hour job.

Number Eleven was a water line leading into Lot 76 on Myron. It was broken by parking a backhoe overnight on top of the line [laughs], but, 'course, the backhoe didn't know it was there. That took only three hours to repair.

I made some notes here which I shall read [consults papers]. While some of the severed lines were only services, the shut-off valves sometimes were a thousand feet to a quarter of a mile above the breaks. Closing these valves on two-inch and fourinch lines were necessary before repairs could be made to some of the services—the one-inch services. This thousand feet of main had to drain before repair could be made. Fire hydrants were affected. Fortunately, there were no local fires during the interim at locations affected by breaks in lines.

Over on the Lakeridge breaks, I made some general notes here to start with. The water system on Lakeridge was a conglomeration of two-inch, three-inch, and four-inch mains and three-quarter-inch and one-inch service lines, So the services and many of the mains were made of plastic and were not detected by metal detectors. Locations of mains were known only approximately. And the plastic mains were roamers, sometimes snakelike, along the several roads, and were many times severed by excavating equipment, as they were not in any sense laid in straight lines.

In one instance along Hillcrest Drive, there were five breaks in two hundred feet of the wandering, black plastic main. Some of the smaller lines—that is, the services—also were plastic. One of these was severed by a common spade digging only a few inches below the blacktop. Locations of the services and mains, and materials of which they were composed, were apparently not known, nor were they mapped by the water company. It was anybody's guess as to where they were

located. There were so many breaks and repairs made that the writer was unable to record them all, as crews were many times working in two or more places at the same time. Nevertheless, I believe I got most of then. The same is true relative to exact locations of services. Mr. Hall, the president of the water company, was at times with some of the crew, and he presumably recorded some of the locations for future reference.

The listing following these remarks shows breaks in lines which were potentially the more critical with respect to fire protection. They are shown by approximate dates y thus the listing is chronological, but shows locations and is taken from the writer's daily diaries and notes. Months covered following these remarks are from July through November 1974. The first one I think is worth describing occurred on the fifteenth of July—a three-quarters-inch line severed at two-thirty in the afternoon on Lakeview Drive, fifty-six feet north of manhole B-13-1. Water was difficult to stop. It kept flowing and gushing for four hours, although the valve designated by the water man was turned off. Water was bypassing this particular designated shutoff and could not be stopped 'till the water man finally closed two valves at the water tanks at the top of the hill. Backfill of sewer trench was delayed 'till it could dry out enough to compact well. Five hours were lost on this time.

I go to the fifteenth break on July twenty-fourth, in which two three-quarters-inch water services—and they were metal—twenty feet and 102 feet respectively above a manhole, and one three-quarters-inch plastic line five feet below the surface near manhole B-2-4 were broken. This was all on Don Drive. Repair was made after four hours of continuous work by the contractor.

On the twenty-fifth of July we had a water service near another manhole on Don Drive

that was severed and could not be repaired this date because no one—and I mean no one—knew location of shut-off valve 'till five o'clock or later.

The three-quarters-inch water service between houses on Lots 8 and 9 was severed, and repair was made on that. The total time was rather small; it took only three hours in this case to make repairs.

I go now into August fourteenth (I'm skipping quite a few). A two-inch plastic main at Station 1 + 74 (that's 174 feet above a certain manhole) and a two-inch steel main about eighty-six feet from a manhole each were broken. And this was all on South Martin Drive, and it took two hours each to repair the two breaks.

And I made a little dissertation here, stating that there were so many breaks occurring that Joe Krmpotic (chief foreman) tried to locate turn-off valves in advance of entering an area so that repair time and lost construction time could be minimal. He also arranged to have a floating stock of repair parts and tools on the job at all times [laughs].

Carlos Archuleta, assistant foreman, was expertise in rapid repair of pipelines, and he did most of the repair work and tried his best to do as nearly permanent a repair job as possible. Workmen and equipment operators were cautious about digging near pipelines; and when location of a pipe crossing seemed to be near, hand labor was used to prospect for the line before continuing with machine digging. This took a lot of time. Metal pipes were sometimes located in advance by instrument, but instrument prospecting is not always a hundred percent reliable.

I have some more remarks here. I think I shall read them [consults notes]. Break Number Twenty-one where Martin Rosso was foreman on a crew—and that was on nineteenth of August. And they were working

on the services for Lots 21, 22, and 28 on Don Drive. And I was not able to check exact locations of those services because some of the markers were missing. And I was not present during the repairs, so I don't know the details. I was busy on the main line at the time on Zephyr Heights where in addition to the lines that were severed by Martin's crew, two plastic water services were severed by the other crew [laughs]. There was three hours lost by the regular crew, and I don't know who did the repair on Martin Rosso's outfit.

On August twentieth, Mr. Hall of the water company appeared at seven-twenty A.M. and asked that leaks be investigated and repaired. Now, those leaks no doubt were water company leaks, but he had a way of indicating that they could be made by the contractor in pulling pipe and stretching it and so forth, which was seldom done, but that's what he claimed. He said they were to be investigated and repaired. This was done by the contractor's repair crew.

[Got a brand new water system out of that!]

Well, not quite because it is a repaired system, but it was in much better shape after repairs than it was before. And there were many of these breaks—I am not going to read them all—there were just too many of them. But the problem was a bad one. What worried me more than anything else at the time was the probability, especially in the dry season, a fire could get started.

I'm going now to skip to September twenty-third and twentyfourth; it took two days for this one, and this was break Number Thirty-five. The entire easterly wing of a trench on Hillcrest Road between pump station manhole and manhole B-40-5 gave trouble. There's a snakelike, two-inch black plastic line ruptured just above the manhole and at the site of another manhole, then

twenty-two feet above still another manhole and about every twenty feet between manhole H-40 and B-40-5. This was really a snaky line. This happened regardless of hand spades prospecting for location of a two-inch main. I was not present when some of these breaks occurred, as I was also covering placing of laterals by another crew on North Martin.

A water service line above manhole B-40-10 about Station o + 45 was also severed. All breaks were repaired, but Mr. Hall of the water company, who had been present when most of the breaks were made and repaired, stated he would not accept the section of two-inch main that had been broken in so many places, regardless of repairs, and threatened to flood the area in question if the contractor refused to replace patched pipe with new material, as he believed that many patches weakened the line to the point that it would be unserviceable. This has been mentioned by me—this condition—prior to this.

Leo Tuccori, accordingly, purchased a new section of black plastic pipe of the same quality of that to be replaced. Mr. Hall had requested metal pipe! A hundred and twenty-seven feet of the replacement pipe was placed in trench, substituting it for the section designated by Mr. Hall. This was done September twenty-fifth.

During the period of September twenty-fourth to twenty-sixth work was also done along Canyon Drive at intersection of Canyon and Hillcrest, and more pipe breaks occurred in this area. September twenty-fourth, Poclain hoe checking for a trench location in Canyon Drive broke a three-inch black plastic line in vicinity of a certain manhole at four-twenty-five P.M., which was a poor time to get a break. This was repaired by crew before dark. Repair was found satisfactory by Mr. Hall and by me, but a nearby area showed a slow leak which was found in a joint put in

by the water company several years ago. The leak was attributed by Mr. Hall, of course, to excessive tension in the pipe when the contractor pulled the pipe sections to make repairs above it. At request of Mr. Hall, ten feet of this three-inch plastic main in vicinity of the breaks were replaced by galvanized steel pipe here. All repair was made by the contractor, of course.

A couple of weeks previously to this—oh, yes—this steel pipe was joined by a steel pipe section put in by Byars a couple of weeks previously.

A leak in a two-inch black plastic line about thirty-five to forty feet west of manhole B-40-5 on Canyon Drive was also repaired by Carlos Archuleta, although it was an old leak and not one caused by Byars equipment.

September twenty-sixth, a three-quarters-inch service line was pulled out; so was a three-inch plastic main which crossed the trench diagonally at the same location. Water pipes were repaired and checked, finding no leaks.

During these three days, water mains were turned off and on many times but were always open after repairs, even if they were made in the evening. Fortunately, there was no fire call in affected areas during working hours. The writer was unable to observe all the encounters with water lines and details related thereto because part of his time had to be devoted to replacement of many service lines in areas where sewer mains were in place.

I shall not read too much more of these, but on Hillcrest Drive on September twenty-second a two-inch plastic main in place—and a three-inch plastic main enters Hillcrest there from Canyon Drive. Both these plastic lines are their usual wandering kind, and I find five different breaks were made— one, two, three, four, five—all in the same day, and all were repaired by the contractor. But in one

operation, the contractor apparently pulled a joint loose about fifteen feet below the repair job. And, of course, he had to take care of that.

There were many more of these breaks. The last one recorded was Number Forty, and that was sort of a duplicate affair. In other words, the gas line people were at work on the Hillcrest Road. It was the Victor Valley Construction Company, and they broke a water line near the upper end of the road, and they did not get water shut off until much water was wasted down the road. This, of course, interfered with the contractor's work because when that ground is too wet to compact well, there's nothing he can do, [but] wait 'till it dries out.

I did not get the time of repair, nor do I know who did the repair on the water line, but I know it took a long time to do it. But at the same time there was a water leak discovered at a service saddle attached to a plastic line forty-four feet south of manhole B-41-1. This was not a leak caused by Byars Construction, but repair was made nevertheless, and it was done by the contractor.

It was just at the crack of dawn this morning when I could make out the hands on the clock as I looked over there, and it was twenty minutes of five, daylight saving time. What awoke me I'm not too sure, but when I was thoroughly awake, "Brother Robin" was up there on top of the telephone really chirping away. He and his mate sort of adopted this place as their property, and he spends most of his time chirping his songs, not only in the morning and evening but in the middle of the day. So I presume the robin was the one that gave me the awakening.

I wondered how I was going to handle this particular tape this time because I really did not make an outline, but I will mention first a few things.

I wanted to get ahold of Joe Krmpotic, but I was unable to do so. I would sort of like to get a little story of his life history. Joe was a Yugoslavian, and I think he was born in this country. He doesn't use any slang at all. He makes a good foreman, a very thorough foreman on a construction job.

I gave something about Carlos Archuleta, who was also a foreman or an assistant foreman, and I found that Carlos made a special trip over here. In the first place, he said he was coming over anyway, because his wife had something to do with horses out here in a contest. That was called of f, but he came over anyway and, of course, brought his family along. And I appreciated that; he came of his own accord, and I acknowledged that. But you can't get everything that you want when you want it. The longer I live, the more I find that to be true.

I want to say a little more about Erik Beyer. Erik and Karen Beyer treated the inspectors and their wives to a banquet at the Ormsby House in Carson City during the early part of January, 1975. That was quite an affair, and although [not] all the inspectors nor all the wives attended, there was probably altogether as many as a dozen at the dinner table. That was a very nice thing to do, and all of us appreciated it.

I have kept in touch with Erik off and on ever since that time. He learned to fly as a younger man; and airplanes and flying of them, the upkeep of them, and all—he actually made it a hobby. And due to that interest, he became part owner in the Truckee airport.

He moved to Reno from his [earlier home], and he sold out his dwelling at Incline in late 1975. And he bought a new home at—the address is 1274 St. Albert's Street, which is located on the slope west of the University of Nevada. It's a newly settled area.

Mrs. Little and I visited the Beyerses last year, and Erik explained his intention relating to landscaping. Karen, his wife, showed us her pantry, which was really loaded with home-canned and preserved fruits. Beyers are Mormons, and that is characteristic of the Mormon people. They are good providers, and they look always to the future.

During my latest contact with Erik by phone, and which was June tenth this year, 1977, he told me he was preparing the plans for some special improvement work in the Truckee, California, and adjacent areas.

CONCLUDING THOUGHTS

As time goes on and a person begins to think about what has happened during his lifetime, one item has struck me which I am going to talk about. I really was prepared with two vocations; and had fully intended to follow the teaching profession, although I was trained in chemistry and could follow that. At the time I did my first job in Carson City, teaching, chemists were, you might say, a dollar a dozen; there were too many of them. So I accepted this job and enjoyed teaching very much. In fact, I figured on making it my life work, so I spent time and money trying to get my master's degree at Western State College. I spent the full summer session [1925], after having taught one year in Carson City. Of course, the graduate work in the small college is made especially a real work project because the small schools—to get fully accredited—make their graduate students [work] extra hard. I think they work less in the larger universities. I practically had to write a master's thesis for every subject I took, and I looked at these theses the other day—read one of them twice. Then I just began to

realize instead of just tossing those away, they probably should be given to Mary Ellen and include that with other items. I didn't realize I had so much on the ball those days, and they were really quite well written.

In [1925], one of the subjects I took was philosophy of education; and I had written a paper, and I made some changes in it and had a girl type it up. But my typist did a very miserable job, so I retained and turned in my handwritten product (and in those days my handwriting was good enough so that most people could understand). And I have forgotten just now who my teacher—could have been Samuel Quigley—but the philosophy of education—I really had education on my mind that that was going to be my life work. That's why I was trying to work on a master's degree.

So in reading that paper over, I had to read it twice because it isn't easily read. The subject was originally "An Introduction to Some Ideas of Progress," and it was a term paper in philosophy of education. The typewritten copy—I changed the title to "Is Progress a

Reality?” And in my original thought, the conclusion was no better than the introduction that I still had the question, “Is progress a reality?” But it was—I worked on it very hard, did a lot of study, had good references, and actually it’s somewhat hard to read—you have to think while you’re reading this. But it wasn’t too bad. I’m going to submit that as one of the papers.*

Then I continued in summer school in [1926], but that, of course, was the year of our marriage. I had been engaged to Ruth since my junior days in college when she was a freshman. And she had two years college, and was teaching in Canyon City, Colorado while I was teaching in Carson City. And we decided to get married in August of [1926] So my summer school was cut short that year, and I helped my dad with the haying awhile; then we were married in Grand Junction, August eighteenth of that year.

We came back to Carson, again teaching. And Gus Hofmann was the principal my first year. I was made—almost immediately—vice principal. Oh, Gus, I guess, had the title superintendent. Carson City schools didn’t have many children in those days. We had about a thousand people here and about a hundred students in high school and probably two hundred and fifty in the grade schools. I got along very well with Gus Hofmann. He had to go to Truckee the following year; they had some trouble, I think, with the governor’s wife. Because of her position, it made it uncomfortable for him to stay here in spite of the fact he was a very good man. Miss Jones (head of the typing, shorthand and commercial department) and I got together; we helped him get that principal’s job up at Truckee, California. (Evelyn Jones—I’m off the subject a little bit, but—Evelyn married Ralph Twaddle, a Carsonite, in another

year or two, and they moved to Redding. I had a notification that she passed away. This happened just this spring, 1977, and they had services out here at Carson cemetery and the Twaddle grave. But I’ll never forget that we did help Mr. Hofmann get a job.)

Charles Priest took over the job. Charles had a fine reputation—a good citizen and good man—but he was very hard of hearing—I probably have mentioned this before—and it was no doubt difficult for him to really tell what was going on in a classroom. As a matter of fact, the four years I taught under him, he never visited my classroom a single time. And whether he did any other teachers, I do not know. His knowledge by observation of my ability was, I would say, zero.

Charles was a very upright man, of course, and attended the Methodist church—he and his family. (He had a very fine wife, Ellen Priest, who is still alive and living in Reno, She is an author of some notes she has written of the memoirs of Carson City, and that little item is for sale.) But Charles had his own ideas about how to run the school, and it was very difficult for him to hear; you almost had to shout for him to understand then. I thought I was doing all right, and I believe my students all thought I was doing all right in school, and I was actually wanting to stay in this walk of life—educating. I think I would have made a good educator if I had ever gone on and really finished my master’s degree and then maybe a Ph.D.—I might have made a college professor. I really think I could have.

I went again to summer school and got more work, and then in 1928, Ruth and I went back, and I spent the full summer again in summer school And at the end of that time I needed only the thesis and I think a few more

*Copies in Little papers, UNR Library

quarter hours to quality for a master's degree. At that time, Ruth's sister, Moss, came up from Grand Junction and lived with us there in Gunnison and took work in music. She was very good in piano.

Well, Ruth was pregnant with our first girl, who was born in January, 1928. And after a few months, Mrs. Little began to lose weight, and her pulse increased; [I] took her to a doctor (Dr. Thorn). He said she had what was called exophthalmic goiter—in other words, an overactive thyroid. And the only relief and cure for it is absolute rest. So that took care of the summer school deal. And it was an expensive proposition; I had her in a rest home located west of Carson.

I got a job in the Highway Department in the testing laboratory under Frank Morrison, who was the chief testing engineer. And I worked all summer there, but I ran out of money soon and had to send Ruth back to her folks to complete the rest cure in Grand Junction, Colorado. Thus I never got back to summer school that summer, and was so far in debt that I kept on working every Saturday down at the Highway Department, in addition to teaching five classes and a little orchestra which I did early in the morning.

And Mr. Priest frowned on any extra work done by a teacher, but I simply had to do it in order to get by. But I don't think I lost out on my ability to teach by so doing.

To carry on a little bit more, Mr. Priest became very ill with pneumonia, and he was out of school for about from six weeks to two months. In addition to my five classes and the music, I had the whole works to take care of, but had no trouble at all as far as the grade school was concerned because Martha Gleason was an excellent principal, and that took care of itself with Martha's direction. I had the high school part of it, and I had very good cooperation from all the teachers. And

Mr. Priest thanked me when he came back for that. And this was my last year, I believe, in Carson.

I wondered why so many of the young teachers who wanted to move around would come to me, the vice principal, for a recommendation. And I said, "Did you get a recommendation from Mr. Priest?"

"Well, uh, we were thinkin' about it, but we haven't." But I never did understand why, but they—there was some reason back of that why they didn't. They—maybe they knew I didn't know it.

Came the end of the year, and I thought as vice principal making twenty-one hundred at that time and the superintendent or principal, Mr. Priest, making thirty-six hundred, taking responsibility, then I should have a raise. So I went before the board, and Mr. Priest clearly turned me down. He says, "You've had two jobs; you're working down at the Highway here, and you don't deserve a raise.

I said, "Good-bye, Mr. Priest!" Here I had spent money to get a master's degree and education make it my life work, and that fixed me.

He was supposed to be, and he was an upright man. He was a Mason. I was not a Mason at the time. He had a good reputation as being a fine man, and he was. Socially, so forth, we had dinner often at their house, and we had entertained the Priests. But there was this one quirk—it was just the thing that was supposed to happen to me. Fortunately, I had worked long enough in the Highway Department that the quality of my work was well known, and they were glad to have me, and they accepted me—I didn't miss a day. The second day after the last day of school was my first day in the Highway Department, and I was appointed assistant materials and research engineer at that time. The title later was made into assistant testing engineer.

So that is why I changed vocations; fortunately I had the qualifications both ways. But the money I had spent and the time I had spent in preparing myself for the educational field was pretty much down the drain.

I thought no more of it for about two years, when there came in the mail a letter with confidential papers enclosed from a teachers' agency with whom I had signed up. Among the confidential papers, of course, was Mr. Priest's recommendation. I read it. It contained fifteen words: "Mr. Little has a fine wife and family and plays in a Carson City band"—period. Well, that was after it was all over, and I tried to forget it, but something like that sticks with you all your life.

Maybe it's supposed to be that way. I am not a fatalist, but things happen. And I do not understand why he should have— why he would do that. However, I put in an application for the principalship at Dayton and never heard a word back from them. I think these recommendations is what did it. Another man by the name of Priest who was no relation to Charlie Priest got the job, and they were good friends—Charlie and this other Priest.

This is something which some people would not put in their life history, but I couldn't help it because here I was. And it made a great change in my outlook on life, you might say. Yet I went right into the Highway Department, and I worked there. And I think over the years I did a pretty fair job.

[I have given several items to] include with papers; and I noticed these two papers I had written. At that time, I certainly was not going to put them in; I thought it was superfluous. But I got to thinkin' about it—actually, it was a part of me. This was my autobiography, and I spent the time on it, so why not? Somebody might get something of information. And it wouldn't change; this was good for—it should be good for centuries.

The other paper I had written in summer school—there were several of them, but these two I kept. This other one had to do with history of education, and the title of the paper was "Social and Educational Change and the Italian Renaissance."* That paper is much more easily read than the one on philosophy of education. I had good references, and I did a lot of study before it was written. And, if I do say so myself, the English is such that it is very easily read and easily understood. And I think it was timely, and I do believe that the Italian Renaissance was, in a manner of speaking, the beginning of modern educational changes that were wrought during that time— were such that they had a great influence on modern education.

* * * * *

Then the sewer job from Round Hill to Glenbrook was finished, that was the last time I undertook professional work, mainly because it was not available. The inspectors were being used, but most jobs were filled; and I didn't try very hard to get another job. So in 1975 I took sort of an inventory of what I had in my yard and the overlooking that had been done for several years, and decided I'd spend most of my spring and summer 1975 getting this yard straightened up and cared of—which I did pretty well. I grew lots of vegetables, as usual, and lots of flowers and gave most of them away, gratis, which was my usual habit.

Along about December, I thought I just better make an inventory of what I had in the yard. And without naming all of them, I'll just remark that I had eight evergreens, including both cedars and pines and some

*Copies in Little papers, UNR Library

shrubs; and I had twenty-seven deciduous trees, and I believe that included seven fruit trees. And I took an inventory of the shrubs and found that I had forty-eight of those and twenty-nine rose bushes, and a total of twenty climbing vines, which included clematis, myrtles, grapevines, Englemann ivy, and so forth. That—I don't know why I did that; I thought I just needed a record. So that is what I found that I had in my yard.

Near the end of the year—holiday time, Thanksgiving, and Christmas—I have not kept a record just what went on those days, but we probably went down to Stockton with some of the daughters. Of course, two of our daughters live there, and the other one lives way back in Alabama. I will not give much—or very little—maybe not anything at all—at present about my family; but I think I can finish what I have to say altogether in one more tape after this one, and that time I will talk about my family.

And when I'm all through with that, I certainly must talk a little bit about Mary Ellen Glass, who has been so faithful and who's given me so much support—and prodding, too, you might say—to get this job done! I'll never forget what she always says: "Well, if you don't do this, nobody else will."

* * * * *

In 1976—that year was made a big year for us because it was our fiftieth anniversary, but I shall tell about that another time. But during that year, several things happened which was of interest to me. Late in the summer of 1975, writeups in the paper and talk was that the little town of Dayton would have to put in a sewer system. Well, I was interested in that; and Walter Reid, the consulting engineer who lived in Virginia City, was to be the engineer on the job and to draw up the plans.

And there was a meeting, I believe, in the fall of the year 1976, at Dayton. Mrs. Little and I attended the meeting, and it was an uproarious situation. I had never heard such a vocabulary filled with obscenities in any kind of a meeting before. So many of the people that talked were dead set against spending the money; it looked like a hopeless thing. I felt badly when Walter Reid was actually insulted; but he has an iron-bound constitution, and he stayed with it.

And just recently, 1977, I got Walter on the phone because I was wondering what had happened to Dayton, and I wanted to put something about it in this so-called autobiography. And I found that the job had never been contracted yet, but Walter has the plans about ready, and he thinks that it will be contracted in July of this year.

I asked Walter about the project. He gave me some of the facts. I believe he said the cost would be something like three hundred and eighty thousand, according to his estimates. And the general plan is to collect the sewage and remove it from the area of Dayton. But there is no treating plant, but it will be placed in a filter basin on a ranch a few miles to the east of Dayton.

Walter also mentioned that at one time I was interested in inspection—wanted to know if I were still interested. I told him, "Well, at first after hearing that meeting, I didn't think I would ever be needed—"

"Oh, but," he said, "you should have heard the—you should have been at the second meeting there. A few weeks after that one we had another one, and surprisingly, we didn't have those radical people there." And I believe he told me that eightyseven out of the ninety-one people present voted to go ahead with this plan! And so, that is going through. I think I will submit my application; but due to my age, I may be turned down on it. But

I'm going to give it a try because if I'm healthy enough to do what I've been doing around my yard, I think I'm healthy enough to take on another job.

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Some things happened in 1976, as I've said before, which were personal things, and I will mention those' [later]. But this year, some things have happened which affect the prospectors, and I'm one of the owners of a perlite claim eleven miles east of Sparks. And I've done the assessment work every year, but then along comes the Bureau of Land Management, which is composed of government employees, many of which are no doubt qualified as agriculturists and environmentalists. And some of them may have some qualifications as mining people, but it is very doubtful. They've come across with a new rule that will slow down and probably eliminate the common prospector. He has to put up a bond of about twenty thousand—ten to twenty thousand dollars—that he will not deface the surface of the earth and so forth and so forth. And there was a meeting in Carson City on this, which Ruth and I attended, At the head table there was Congressman Santini and Congressman Abraham Kazan from Texas. And there was a William Schafer, and another man whose name I believe was Tom Cavernarn—I am not too sure of the spelling of that name, or of the name itself. And they made some remarks, and the meeting was arranged so that people could come with written remarks if they wanted to talk.

And thirty-five—the house was filled with prospectors, most of them with a fairly open mind, but many of them with “thumbs down” on the Bureau of Land Management. One old fellow was so rabid that he got up and started

using some profanity about the situation, and he had to be removed from the room. But there were thirty-four people there, all of whom either talked or had papers; I think there was only one or two who talked without a paper. And I'm not going to mention all these papers but—the people—but many of them were mining engineers, who had their thoughts on the proposition, and they were good.

One of the papers was given by a girl who was a fourth generation in a family of miners, and she had an excellent paper. I have her name written down here someplace—Marie Bedford. And there was a Mr. Kim Bedford spoke, who had been mining for thirty-eight years. And he was also a professor of geology. This young lady had an excellent paper. She was probably not more than twenty years old; I took her to be a college student. I don't know whether she was a University of Nevada student or not.

But many of these papers were very up to the point, and there're comments in between by the head men up at the top table—the congressmen Santini and Kazan, especially. And this meeting was to last about three hours, and it lasted five hours.

Many of the papers were very well taken. And Santini is a loner from Nevada in this House of Representatives, which I think there are some four hundred members, and he has a real tough time making his voice heard. All of the others from the East in particular are interested in their own areas, and the West is nothing to them. And Santini has a rough time on his hands; he has to talk to these people, and do the best he can with his talk to try to get something through Congress. And he actually has succeeded in doing some things. He's got to have—you got to give him a lot of credit for trying.

This Abraham Kazan learned a lot about it that he hadn't known. He was from Texas,

and he was all for changing this. And I believe there will be some changes made by the Bureau of Land Management.

I was sort of ired about the thing, so I called up the Bureau of Land Management people, and called the Reno office first, and later the Carson office. And Ed Rowland, I believe, is the head of the Bureau of Land Management in Reno, and he gave me some new information. I was particularly gratified to know that nothing will be done for sure about the ordinary prospector who was just working on a mining claim—who has a mining claim—for at least three years. I believe they're going to have to revise some of their ideas.

He also told me to call up the Carson office, so I might get one of those men in that office to go with me to examine this mining claim. I did call the Carson office, and he was a trained mining engineer, I think, and a trained geologist. And he told me there was really nothing to worry about in my case. Although there were several owners on it, I've taken care of the assessment work each year, although Mrs. Bessie Allen—she and I are the chief owners—would put up half of the cost. And he said, "That will have to be continued; you go right ahead"—that is, this Carson man in the [BLM]—"You just go right ahead with your assessment work for the next three years in a regular manner. At the end of three years, about that time, something more may be required in your case." So I was quite well satisfied to learn that much about it.

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Ruth and I attended another general meeting which had to do with water. I thought it would be quite a spread, and I expected to see at least a hundred or two hundred people there. I was really surprised—it was held in a

very small room, and the people at the head of the thing was the Women's League of—I think, of Humanities, I think it is called. Mrs. Little said, "Well, you might have expected it to be like this with those people putting on a meeting of this kind!"

There were slides given; and up at the head table, there were three men. This panel was introduced by the head woman of the Carson City League of Women Voters—that's what this really was. I had those names; among them was the deputy attorney general Lou Doscher, and there was a man representing local contractors; his name was Dwight Millard. He belonged to the Carson City Building Association. There was a doctor, Jim Roberts, who lives on King Street; and he talked about the humanities and the living things that people go through within their lives, having to do with water and so forth.

The discussions were good, but the audience was composed of about fifteen people—no more than that. And that is disappointing to me because the meeting was good; some poignant points were brought up. Dr. Roberts took care of the humanistic perspectives in his talk, and Lou Doscher described possibilities where Carson could increase their water supply—those are well known to most people. He described what could come from Ash Canyon by purchasing part of the water right from John D. Winters, which would amount to only 165 acre feet, the cost being a hundred and twenty thousand dollars. A purchase took place recently.

He also mentioned, of course, the Marlette Lake proposition, which is probably clear out of the picture for several reasons, one reason being that it is part of the Tahoe-Truckee watershed; but the water actually flows on the east slope of this range, the Sierras, because it was channeled that way years ago to supply Virginia City. Now that the Pyramid Lake

Indians are in the process of getting together a suit to return the water from the Truckee River watershed to Pyramid Lake, that Marlette area would also come under that category. So there's quite a problem there, and the Reno and valley people there are going to face something pretty tough, especially if the Pyramid Indians win that suit.

Anyway, discussion was good. What people were there to listen got something out of it, and a suggestion was made (which was a very good one) that although the Douglas County people were set against letting Carson City having any water from that area, it made one possibility. Another possibility was the building of the Watashameau dam, but that would be delayed for at least twenty years. That would be the best of all.

But Lou Doscher said the best thing he could think of was to get a real compact going with the regional people, including the Douglas County people and the Carson city people, regarding the water situation to see if it couldn't be resolved that way.

Carson City now has nine wells in operation, and they're drilling another one. I asked Mr. Doscher what the situation was with respect to the water table. He said, "Well, actually, in some places it's going down." However, I do know that in the great fault area—the great fault that runs through Carson City here from the mountains to south of us, under what used to be the old schoolhouse (now an office building), and under the highway (U.S. 50), and actually under a schoolhouse that was built right on top of it, down a few yards away—there is water in the upper side of that fault area which is still—from artesian wells and so forth—which is still available and has not been affected materially by the wells which were drilled. The principal water supply, I believe, is above that fault area because the wells drilled farther east—the

farther east you go, the less water there is, and the deeper they have to go to get it.

This is a real, serious situation. From my own understanding of the water supply which we have in Carson City, being a member of the Highway Department testing laboratory which took care of official U.S. government records ever since the laboratory was started, I have a pretty fair knowledge of what water is available. It cannot be much more than an average of about nine inches in the valley portion to replaceable water—that's an average. Although in looking [through] some records I found one year way back in the forties, we had as much as twenty-one inches; but then we've had as little as five inches. This year, we're down to about three to five and six thus far, July 1, 1976 to June 30, 1977.

The mountainous area above us, Ash Canyon and King's Canyon, produce quite a flow of mountain water which comes down from only this side of the slope in the Carson City or Ormsby County; and I imagine that amount, as near as I can estimate, would average about eighteen inches a year. The state engineer has made estimates of what is available; and of course, he's in a better position to know.

But there is a real water shortage here, and I'm making a prediction—maybe I'm going to be all wrong on it: I think we have enough water to keep a population of twenty thousand here, but with thirty thousand people here and more building going on, a stop is going to have to be put to the water, or rules and regulations are going to have to be made. I predict if building is stopped altogether, we will lose fifteen thousand people. I think there are that many people who are workmen and their families, such as carpenters, plumbers, bricklayers, paperhangers, the steelworkers, and so forth. If things are shut down, those

people will leave, and these outlandish prices of houses will go down, and we will have a depression—unless a water supply of sufficient quality as well as quantity can be obtained. That's all I'll say on this.

I shall begin today on what were my principal activities in 1975-76 and at least the first half of 1977. My principal activities were connected with the home yard and the house— yard work, such as cleanup, and relandscaping to some extent, and quite a lot of pruning, and cleaning out some noxious shrubs and perennials and weeds. It's been my habit for years to give to local gardeners and to friends. I gave away all the iris I had. One year, I just piled up a big pile of them outside of the fence and told them to come get them. I could no way get the grass out of the iris unless I took the iris out, so I decided I didn't want any more. Believe it or not, every one of those iris outside the fence disappeared [laughs]!

I have given away many annual plants and vegetables. I start most of my things, especially tender ones, in a hotbed. I harden them off in the cold frame, and always have way too many. Before there was a professional nursery in Carson, I was the "free nursery" for most of the neighbors and some of the gardeners I knew. [Laughs] I also acted as a free consultant on horticultural problems for neighbors and friends.

I have a large yard. There were two large lots, and to square it off, I bought a fraction of another one. The total area of my yard and house and the rest of it amounts to about four-tenths of an acre. I used this space during the last two years for quite large plantings of certain easily grown food items, such as German spinach. (German spinach is called that, but it really is not; it's related to the common weed, but I can't remember the name of the weed.) I put in lettuce and

carrots and summer squash and tomatoes; and I made trips every few days whenever these vegetables were producing to the Senior Citizens headquarters at 901 Beverly Drive in Carson City.

[The Senior Citizens] center is just south of the cemetery and adjacent to the county engineering building. The original money was put up by the Kiwanis Club, and they still give a certain amount of money every month, I think. There's a few volunteers—in fact, there're quite a number of volunteers who help prepare things, and there are paid cooks at the place. Five meals are served there each week (lunches, Monday through Friday), and it's very interesting to see the people who go there. But believe it or not, those poor people all drive cars or seem to; and you can't get into the place if you happen to go there during the noon hour [laughs]. I asked about the number they serve; they say about seventy-five people, as a rule, and another thirty to whom the meals are delivered at home—people who are disabled or can't get around. And those who care to pay may do so—any others get the meals free—and I'm told that only one-third of the meals are paid for by the recipients.

The Senior Citizens headquarters, as I've said, was in part, at least, built from donation of the Kiwanis Club. Now I am a Rotarian, but I believe in the motto, Service Above Self; although it's a Kiwanis project, I don't mind donating extra vegetables. I made about a dozen trips down there with free vegetables and some bouquets of flowers in 1976. So far this year, 1977, I have made sixteen trips prior to August ninth. And time permitting, I will make a few more when the summer advances—that is, when it advances far enough to—for squash and tomatoes to mature.

Since May tenth, I have delivered sixteen washtubs full of German spinach, which

seems to be the favorite vegetable, since it is rich in vitamins. I harvest the entire plant, fill the washtub with these plants, and volunteer helpers pick off the leaves, wash, and prepare them for cooking and salads. I've also given them carrots and lettuce and onions and other vegetables.

Much of my time since finishing my work in the Round Hill to Glenbrook sewer project has been spent from voluminous diaries, digging our records. The subject matter for my oral history interviews has come largely from such diaries.

During this season, 1977, I set out in beds about six hundred China aster plants, intending to disbud the principal blooms and sell the flowers at wholesale rates to the local florists. I did this years ago for Reno florist Hiney Cooper. I had gone over to a florist show, and I got a first prize on my asters. I didn't know Hiney at the time. Later I knew him as a Rotarian and, of course, I did business with him for quite a while.

Hiney came up to me and said, "Did you grow those scrubs?" [Laughs]

It rather took me back, but I said, "Yes, I did."

"Got any more of 'em?" says he [laughing].

So he told me how to ship them and send over a bunch that he would try. As a matter of fact, I think I furnished every aster Hiney sold for about five or six years. I grew them, but I didn't get much for them. I only got two dollars a hundred, and I watered—they've been watered—the seed and everything. But in those days a dollar was a dollar. It isn't twenty-six cents or something like that that we have today.

I am not sure this project I've started this year will be completed because I have had the offer of two inspection jobs. One is the Truckee River landscape and beautification project for about three blocks long adjacent

to the Truckee River, and the other is the Dayton sewer project. I may accept the Dayton project. I've gone over and looked over the plans and thought about the Reno job—I could've had it, but I also thought of that seven o'clock traffic over the main highway and the five o'clock traffic. If you've ever been in it at those times, it's terrible, and I don't think it's worth it. So I sent my regrets and decided that maybe I would try more for the Dayton job. I haven't heard yet how I've come out on that.

* * * * *

I seem to be so busy that all my time is occupied with some kind of work project—gratis or otherwise. Sixteen of my days lately, however, have been otherwise diversified entertaining a twenty-one-year-old grandson, Larry Eidson, on leave from the U.S. Navy.

Another grandson, Jack Eidson, his wife, Elva, and two-year-old son, Jonathan Lee (notice that Confederate name) plan to visit here for a week, August fifteenth to twentyfirst. They live in Alabama.

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I might mention at this time an item which has been of much interest to me, but it was written up in the February 27, 1977 issue of the Carson City Nevada Appeal. It has to do with choosing a "bicentennial" or "centennial" tree. Noreen I. K. Humphreys wrote the article. It happened that in 1975 the American Forestry Association requested that all states designate a "bicentennial" tree. The choice for Nevada just happened to be that huge old cottonwood tree at the corner—northwest corner—of Washington and Division streets. I had driven by there many times and always admired it. In fact,

this committee put up a sign on it stating that it is the “bicentennial” tree, and the article written by Noreen Humphreys, covering the entire sheet of the Nevada Appeal— I am submitting that. It shows a present picture of the tree and an early view—the sketch, really—which shows the tree as a little thing about a hundred years ago.*

* * * * *

The tape (Number 58) is assumed to be the final one. I intend to outline some of the reasons for consuming so much time with preparation of these tapes. Fortunately, I have kept hundreds of sheets of daily diaries and notes on lab tests, construction projects, and the like. Without these references I could never have gone into such a detailed description.

The tremendous growth of our country and of other countries in the second and third quarters of the twentieth century can be attributed to rapid and efficient transportation on land, sea, and in air. The source of energy to abet such transportation is and has been the petroleum products derived from huge layers of buried organic hydrocarbons resulting from partial decomposition of masses of dead prehistoric animals—in other words, “dinosaur juice.” While these petroleum sources have been tremendous in size and quantities, much of the total quantity available has been already used to the limits of extractability. In other words, the supply will no longer meet the total demands in spite of intense exploration efforts to find new sources under the land and under the sea.

Petroleum products needed to continue as we have in midtwentieth century—the modes of living—simply do not exist in an unlimited supply. Costs of these petroleum products already have risen as much as

double what they were a very few years ago. These costs are felt in all areas of energy use on land, sea, and in the air.

Supply of asphaltic products extensively used in pavements and in industry are affected also. Their origin is the same as our fuels. It may be thus assumed—or better, acknowledged— that our fuel supply and industrial use of petroleum products has peaked in mid-twentieth century, and the curve is going downward. This means our scientists and engineers must turn to other sources to produce continued rapid transportation and to provide heating, refrigeration, electrical energy of all sorts, and paving materials as well.

I have described quite in detail the mid-twentieth century methods of constructing facilities, such as highways and pipelines, to move people, supplies, and waste products, all in this age of petroleum-produced energy. Since the age of petroleum-derived materials certainly has reached and passed its peak, new energy or the material sources must be and probably will be developed by engineers and men of science. Such new sources will no doubt alter construction methods machinery, and transportation vehicles to the point that twentieth century man would be almost at a loss to believe them. Solar energy and probably nuclear energy, if it can be developed safely, will probably be adaptable in the future. Mankind, some four hundred years from now, say—providing he is not destroyed by atomic warfare—will look back on our twentieth century doings in a historical sense only. Hopefully my detailed description of twentieth century construction methods and the personnel involved in

*See Little papers, UNR Library

highway and pipeline building will be of value and interest to future history researchers.

I am not a believer in philosophy of progress as it applies to human advancement. The connotation "progress," to my way of thinking, can, for example, refer only to the stage of completion of a work task, such as the writing of a book or the building of a bridge—something that implies a beginning and an end.

The word which has a truly endless connotation—in fact, as endless as time itself—is the word change. Change is forever. I like these three words to describe change. I think the same three words in the German language produce a better fixation by placing the verb at the end, which is the German custom—"Veränderung ewig ist."

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I should include some words about my family, and will start by telling about my sister Helen. I have no other sisters, and I have no brothers. Helen stayed at home on the ranch (she finished grade school there, of course) 'till about 1928 when she came to Carson City. She worked for a short time with Clara Crisler, our neighbor, helping with the household and care of Clara's invalid mother.

In a few months, she passed an examination for a United States government job at Stewart Indian School. She worked there in several jobs. She was for a while in charge of the laundry, also was little girls' matron. However, she developed a leg circulatory ailment called phlebitis, and retired on disability after being employed for seventeen years.

She had friends in Lytton, California, which is north of San Francisco area, and she received a job there which she could handle with her leg problem. She was in

charge parttime of a children's home. She met her future husband, Wilson Lindsey, there; and after five years in Lytton, they settled in Baxter Springs, Kansas, Wilson's home.

Wilson died in 1956, and Helen stayed in the Lindsey home until 1975; she sold the property and moved back to Lytton, California, where she now resides in a trailer home. She's still bothered with the leg problem but has worn rubberized stocking supports for many years. She attended our golden anniversary at Stockton, California in August 1976.

Next I will tell about Ruth, my wife. She has added some things, I should say, to Nevada history. I have told earlier about her parents moving to Carson City in the early 1940s. They lived with us in the two-story house we owned at the time. Later, we let them take over the first house we owned and which we had rented. I've already told about Mr. Fairley starting a nursery there called the Carson City Nursery, and operating it very successfully for years.

Now Ruth was born in Cripple Creek, Colorado in 1902. At the time, her father was a gold miner. Later, he changed his principal occupation. He was well grounded in horticulture; and they moved to Grand Junction, Colorado, where he became employed as a horticultural specialist by the Grand Junction Fruitgrowers Association.

I met Ruth at Western State College in Gunnison, Colorado, where she received a two-year teaching degree in 1924, the same year I graduated with a four-year degree. My intention originally was majoring in chemistry and becoming a chemist only, but the chemists were so cheap in those days I decided I'd try teaching. So I also made enough credits to get a major in education. Ruth taught school—primary section—in

Canyon City, Colorado in 1924-25. We were married August 18, 1926 in Grand Junction. We came to Carson City where I was teaching at the time, and we have lived no other place since we were married. At the present time, that amounts to fifty-one years.

Ruth was a “natural,” so to speak, in teaching and care, especially children in primary school and younger. We rented a four-room cottage owned by Mrs. Helen Gies on Phillips Street. Ruth could hardly wait to continue her teaching. She started a private kindergarten at that house in early October, 1926, but discontinued it in March 1927 to accept a third grade teaching assignment at the Stewart Indian School where she finished out the spring term for another teacher. Something happened to that teacher; I think she had to retire on account of illness.

Ruth accompanied me to Western State College, Gunnison, Colorado, summer of 1927, where I had begun work on what I thought was going to be a master’s degree [chuckles]. Upon returning to Carson City, we could not find a place to stay, so we moved in with Edgar and Margaret Norton, friends of ours, for a period of about four weeks until the Helen Gies cottage was again available.

Ruth went back to Stewart and taught third grade for about three months, at which time she resigned because our first child, Moss Helen, was born January 20, 1928. In 1928 she tutored a handicapped student for several months until Ruth came down with a bad case of exophthalmic goiter, which is caused by a superactive thyroid.. She lost weight until she went down to about ninety-six pounds, and her pulse increased about twentyfive percent.

I kept her in a private rest home until our money supply ran out. Then she and Moss Helen, the baby, were sent to Grand Junction to stay with her parents while I stayed in Carson and worked all summer as chemist in

the state Highway Department. The rest cure Ruth received at her home in Grand Junction completely alleviated the superactive goiter condition, and she and Moss Helen returned to Carson in late October. Ruth did no more teaching for about fourteen years. There were simply too many things going on with a young family.

We then moved into the Herman Smoot house as renters in February or March, 1930. Our second daughter, Joan, was born July 18, 1930. In the summer and fall of 1931, Joan became dreadfully ill with a persistent case of colitis. We very nearly lost her and probably would have had it not been for Dr. [Noah] Rouse. We gave him full credit for saving her. He did something no modern doctor would do: he stayed up with her twenty-four hours in our home at the most critical time and brought her through. Nowadays doctors send all critical patients to a hospital largely in the care of nurses and aides who may not realize how critical a case may be. Times change.

We purchased the little cottage from Mrs. Gies in 1931, and moved back into it. it contained—besides the house—a fuel shed and an entire half block of land. We purchased it at a very low price, partly because of our friendship with Mrs. Gies. She actually insisted that we and no others were to purchase the property.

Later, about 1942, we purchased the Millard house at 112 Phillips because it had the room we needed. We had a growing family of three girls, Elaine, the youngest, born on June 4, 1932. It had three bedrooms upstairs, and three girls could use the one large bedroom. The large house also enabled us to house Mr. and Mrs. Fairley, Ruth’s parents, until we could release the Gies property from the renters.

Ruth again started work at Stewart Indian School in February, 1942. She was a substitute

teacher—first, second, and third grades. She also had duties as girls' advisor and supervisor of girls' dormitories; and at times, especially during the flu problem in the spring of 1942, she helped with the hospital and health department.

In the summer of 1943, she supervised the refreshment room, and spent part-time in the library. All Indian School personnel were required to attend this summer session, and our three daughters worked at Stewart with Ruth that summer, but were not enthused about it. At least they were not on their own. The oldest girl, Moss Helen, was an office flunky—between offices. Joan, the second daughter, dormitory room mail clerk for employees; and Elaine, the youngest—eleven years old at the time—was dining room bus girl. The pay the girls received was very little, but they also received a free noon meal. They had expected to receive some tips, but tipping was not done in this institution.

Ruth continued as a substitute teacher on a day-to-day basis until the end of the school term 1948. Her pay was a hundred and twenty-five dollars per pay period—that is, each thirty days.

Mrs. Fairley became quite ill in the early spring of 1947 and passed away. Mr. Fairley decided to sell the nursery, which he did late that same year. He moved to California, but passed away two years later. Both Mr. and Mrs. Fairley are buried in the Carson City cemetery.

Ruth started teaching at Tahoe, where a school was established in a building at Zephyr Cove on the church conference grounds. This building was formerly known as Sam's Market. There were a number of permanent residents in the area, and a number of temporary residents, such as divorcees. For many years, no one but very few of these people lived around up at the

Lake year round, and there was not a need for a school.

This school was opened the year before in a building on the beach at Zephyr Cove. This second year, they moved them into Sam's old market. Ruth had eight students the first year, eight being the minimum number of students in an area requiring a new school—just made it! While it was an eightgrade school, there were never pupils for each grade in any of the four years she taught there. School supplies, such as desks, books, and so forth, were furnished by other Douglas County schools. Ruth's state supervisor, whom she liked very much, was Mr. Warren. He was the state deputy superintendent.

Student personnel varied during the year because of temporary residence of some of the parents. For the sake of historical record, following are the names of the first eight students—that is, the permanent residents in Ruth's first year teaching there: Bob and Susan Amundsen, whose father, Ken Amundsen, was chairman of the board; Vickie Lee and Penny Gunther, both girls; Lynn Bittler, whose father was [clerk] of the board; David Butner; and the two Robinson boys, Richie and John Robinson. At the present time, 1977, all of these just named except David Butner still dwell in Nevada.

Ruth taught four school years in this school and lived at the Lake in winter weather and commuted from Carson in early fall and late spring. One winter, Ruth and I lived at the Lake, and I did the commuting to work in Carson City. Our house in Carson was lived in and cared for by Marguerite Nelson, a Carson girl.

The house we lived in is a stone house on a hillside. It is the first house on the east of U.S. Highway 50 as the road makes the turn to the south at the Glenbrook road intersection. We lived there as caretakers only, as the owners

were away on an extended vacation. Our three daughters at that time were all in Stockton, California, two in College of the Pacific; the oldest, Moss Helen, a graduate of that institution, was teaching. It was an interesting and beautiful place to live that winter. I missed only one day of work at the state Highway Department, and I missed that because of deep snow which took me most of the day to dig away out from the garage to the highway [laughs]!

After finishing her fourth year at Tahoe, Ruth became a Carson City teacher. She taught third grade in Carson for ten years, 1953-1963, and in four different schools. She retired in 1963—that is, she retired from teaching—almost. She received an honor given to but a few teachers; she was elected to Delta Kappa Gamma honorary society for teachers. Part of her credentials for such an honor came from her outstanding relations with the Indian students and their parents, while at the time she taught at Stewart. This was a very unusual accomplishment.

As a young woman, Ruth was very active in youth organizations. She did much work on committees of the YWCA and Girl Reserves in Carson and Reno in 1926 and 1927. Later she was counselor for the Girls State organization. During that time our youngest daughter, a high school junior, became governor of Girls State.

Ruth was Mother Advisor for the Carson Rainbow Girls in 1942 and 1943. She was also active in Eastern Star and was Worthy Matron in that organization in 1940.

Shortly after retiring as a teacher, she was hired by the Carson City Nugget as supervisor of the children's lounge. She reorganized operations to a standard which has been followed closely in the years since she worked there. She spent four seasons in that endeavor. The Nugget in those days—1960s— kept the children's lounge open only in the late spring,

the summer, and in the early fall. At present, I believe it is open all year.

In 1967, when the Job Corps were organized and a camp approved for operation in the Clear Creek area, she was hired for two ninety-day periods as a special teacher. These boys were underprivileged fellows. They were of various origins. Many of them were Negro and some Indian, and there were a few whites. And their ages varied from about sixteen to twenty-one, and they came there to learn to read, write, and do simple arithmetic, and possibly to learn how to do certain work items. Ruth enjoyed this work with the young Negro men, especially; and they seemed to respond to her teaching efforts. She says that she never realized that she would ever experience the kind of situation she found there. Some of those boys—in fact most of them—had never learned to read, write, or do simple number work.

President Johnson had the idea of the Job Corps and promoted the establishment of this Job Corps. But when Nixon became president, he cut most of them out. The Clear Creek camp was thus discontinued after a couple of years. The boys in this camp were supposed to learn enough about forestry and heavy equipment to serve as aides in the U.S. Forest Service.

Since finishing at Job Corps in 1967, Ruth has stayed pretty much at home, attending household duties. She has had two operations for cataract removal and is losing the sight in the right eye almost entirely. Also she is bothered by a progressive rheumatic condition in her left leg. Nevertheless, she does her housework and is still a good cook and is very successful at entertaining visitors, such as daughters, sons-in-law, and nine grandchildren.

She does a lot of reading but has given up activities in social and lodge work. In

all, she certainly has contributed greatly to raising and educating three daughters, also caring for nearly two years for the youngest daughter and her family of three boys after the separation from her first husband. She also bore a part of the burden of helping her father and mother to adjust to living in Carson City. It was difficult for Mrs. Fairley, who had left all her old friends in Grand Junction, Colorado, but Mr. Fairley adjusted very well and succeeded very well in procuring work and finally in establishing a good nursery business.

I must now tell of some of the happenings concerning our three daughters.

Moss Helen, the eldest daughter, was born January 20, 1928, in what was then called the Reno Hospital, Dr. Bart Hood attending. Joan was the first girl baby born in the new annex of St. Mary's Hospital; her birth date was July 17, 1930, Dr. Bart Hood attending. The Catholic sisters wanted us to name her "Mary" in commemoration of the fact that she was the first girl baby arriving in the new St. Mary's annex. Of course, Ruth had already decided on the name "Joan."

Elaine was the only one of our children born in Carson City. She was born in the little house at 704 Phillips on June 4, 1932.

In May 1932, both Moss Helen and Joan came down with a quite severe case of measles. The doctor attending was again Dr. Rouse. He was certainly an excellent children's doctor. Elaine, the youngest, seemed to escape the usual childhood diseases.

As the children grew, more room was needed, and we bought the two-story Stenz house at 112 Phillips. The three girls did well in grade school, and at high school age they also made good grades. All three were given piano lessons, too. Their first music teacher was Katherine O'Brien, a local girl. Later they took lessons from Mrs. Harriet

Parcher, who lived in Bishop, California, but had board and room in our home during the periods she came to Carson to teach her students. Our girls received their music lessons gratis in payment for Mrs. Parcher's keep. Joan and Elaine are really not adapted to piano playing and gave it up. Moss Helen, however, continued with Mrs. Eva Flowery, who was a very excellent musician. Moss Helen did very well but did not continue in music at college. All three girls played in the Carson High School band. Moss Helen was an excellent bassoon player, and Joan did well on the French horn. Elaine managed to play the cymbals, and that was the limit of her contribution to music.

All three girls were members of the Carson Rainbow Girls. The two oldest girls went all the way through the chairs, and each became Worthy Advisor. Elaine, however, did not hold any elective office in the organization, although she held several appointive offices.

Then Moss Helen graduated from high school, the Gray Nashburn scholarship was divided between her and Bill Hancock. They both had identical top grades. Thus they each received five hundred dollars of the one-thousand-dollar scholarship.

The first Nevada Girls State was organized the year Joan was a junior in high school. Two girls, Joan and Margaret Berger, were chosen to represent Carson City. Joan was elected to superintendent of public instruction, and I believe Margaret was elected state mine inspector.

Elaine was one of the girls chosen to represent Carson in her junior year. She is something of a politician. She decided to run for governor of Girls State; therefore, one of her ideas was to wear the same outfit at all the meetings every day, as it would help to identify her to the other girls, who really were strangers to her. She was elected governor.

While [I was] attending college at Western State in Gunnison, one of the invited lecturers was Dr. Tully Knoles, then president of College of the Pacific. I was so impressed with the deep sincerity of the man in presenting his philosophy of life that I decided if ever I should have children, I would insist they attend the College of the Pacific at Stockton, California. With a president of the caliber of Dr. Knoles this surely would be a proper place for them.

Ruth and I sent all three girls to College of Pacific. At that time our daughters were there, Dr. Robert Burns was the president, but Dr. Knoles was still there in emeritus status.

It is a private college—Methodist, in fact. It's now a university. It was changed just a few years ago, and it is very expensive. We both worked to ensure that our daughters would go there.

Moss Helen attended COP four years and graduated with an A.B. in education in 1950. Joan attended for four years and graduated in 1952 with a Bachelor of Arts in food processing. Elaine attended two years only, having been married in her sophomore year.

All three girls were members of the Tau Kappa Kappa sorority. At that time, COP would not allow national sororities; eventually they did, and Tau Kappa Kappa became Tri Delta and membership was open to alumni. Moss Helen transferred to Tri Delta, but the other girls did not do so. Later in her teaching career, Moss Helen was elected to Delta Kappa Gamma honorary education sorority, same as was her mother.

Joan played her French horn in the COP band for four years. She left it home, and I picked it up and managed to get so I could play it. N. A. Tinkham invited me to play it in the Reno Municipal Band, which I did for a number of years. But I had to join the Musicians Union in order to do so.

Upon graduation from college, Moss Helen applied and received a teaching position in Stockton elementary schools. That same year she married Ed Pickering, whose family and background I have previously described. She taught for the first five years that she was married. Then Chuck, her son, was born in April 1956. The five years of teaching gave her a life credential to teach in California.

Daughter Sandra was born in June 1960. We call her (everybody does, in fact) "Sandy." Moss Helen taught as a substitute in 1967 to 1970. In 1971, she taught in the reading laboratory full-time at Delta College through 1973. Since that time, she has taught as a specialist—a reserve teacher—with handicapped children. She started graduate work while teaching and received her master's degree in English at UOP December 10, 1976. Ed Pickering, her husband, is an executive in government warehousing at Tracy warehouse. Chuck, the boy, is presently attending college at Sacramento State. Sandy will be a senior in high school—Tokay High School—this year. She's an excellent swimmer, and she received many awards in several meets.

Joan's major in food processing required her to spend part-time at work in the food processing while she was going to school. one-half year was spent in the Richmond Case cannery at Stockton as a part of her college work. She decided, however, that food processing was too seasonal for full-time work. So she studied and worked for a year as trainee as a medical laboratory technician, then passed the examination, and received her state license.

In 1954, she married Ben Remington, who was employed by the Stockton Record as a reporter. Joan worked almost five years as a medical lab technician; but two years after her marriage, the first son, Benjie, was

born in June 1957. A second son, Roger, was born in June 1959, and a daughter, Marla, in August 1961. Joan worked part-time as a lab technician for eleven years, while the children were in need of much home attention. Since 1972, however, she has worked full-time.

Ben and Joan are dog fanciers, and Ben is an accomplished hunting dog trainer. Every year he and Joan do a lot of work as officials at hunting dog trials. The family also has a tendency to do mountaineering. They bought a cabin for both summer and winter recreation at Bear valley in the Sierra.

Benjie and Roger are both attending college. Benjie graduated from Delta college—a two-year course—and will attend Sacramento Agricultural College the next two years. Roger will be in his second year at Delta College this coming year. Daughter Narla will be a junior in Stockton High School the fall of 1977.

Since Elaine, our youngest daughter, lived in Carson City as a married woman with her three boys for a period of about seven years, we had been better acquainted with her family than with progeny of the two older daughters. Elaine and Mike DeRuyter, her first husband, came to live in Carson after two years of college for both of them. Mike became a police officer. The three boys, Mike, Jack, and Larry, were born two years apart—1952, '54, and '56.

I believe I have already told something of Mike, Sr.'s unbecoming activities and his mishandling of his thirtythousand-dollar inheritance. His activities at this time caused Elaine to divorce him. She and her three boys stayed with us for about one and one-half years. During that time she worked part of the time in the office of the Carson-Tahoe hospital.

Later she married Jim Eidson, a civil engineer with the Bureau of Reclamation.

That came about a little more than a year and a half after her divorce. They purchased a home about five blocks from us in Carson City, and they lived there only a short time when Jim decided to go back to his home country in the South. They moved to luka, Mississippi, where Jim was employed by the Tennessee Valley Authority.

In March 28, 1961, a daughter was born to Jim and Elaine. She was named Moss and represents the fourth generation in Ruth's side of the family to receive that name. The individuals in those four generations respectively are Ruth's aunt Moss, the first Moss—of course, on her mother's side; the next was Ruth's sister, Moss, who is now Mrs. Victor Wagner; the third was our daughter, Moss Helen, who is now Mrs. Ed Pickering; and the fourth, Moss Eidson, Jim and Elaine's daughter.

A few years after Moss Eidson was born, Jim was transferred to Haleyville, Alabama, where he serves as field engineer for the Tennessee Valley Authority. In Haleyville, Elaine attended Northwest Alabama Junior College for two quarters. Afterwards she taught as a substitute teacher in both Haleyville junior high and senior high schools, each for two six-week periods.

Elaine's three boys went to grade school in luka, Mississippi and in Haleyville, Alabama. They all graduated from Haleyville High School, two years apart. Daughter Moss will enter high school this fall as a junior.

Jack is the only one of the three boys who attended college. He attended the Northwest Alabama Junior College for two years and received an Associate of Arts degree. He is now married and works as a dye chemist in the Kyser Clothing Industries Company. He and his wife, Elva, have a two-and-a-half-year-old son, Jonathan Lee. The three of them will visit us and the families of Joan and Moss

sometime between about the fifteenth and twenty-third of August this year [1977].

Mike, Elaine's oldest boy, graduated from high school in 1969 and enlisted in the Navy but did not have to report for duty 'till fall. He spent the summer season with us in Carson City, and I secured work for him at the Incline golf course, Lake Tahoe. He commuted back and forth to work with me, as I have previously explained. After reporting to the Navy, he was assigned to nuclear submarine duty but had to spend more than two years in intensive training at Vallejo, California, in Connecticut, and at a special training center in Idaho.

He was married in May 1971, and he and his wife, Pam, moved to Hawaii, which they called their home until Mike's six years of service was up. Mike's Navy base was on Guam, but he was home periodically and did special studies at those times. Mike and Pain spent about a month with us in the fall of 1976 and later turned to Alabama. Mike secured work as a nuclear engine specialist at a southern Alabama nuclear power plant.

Larry, Elaine's youngest boy, is now twenty-one, I believe. He joined the Navy just out of high school and was assigned to the boiler room of a ship which serves as a troop transport plus special assignments—so he is a fireman. I don't believe he enjoys it very much. Nevertheless, now in his third year, he was sent to boiler fireman's school in San Diego and spent, I believe, six full weeks there, after which he spent better than two weeks with us.

And that training may enable him to secure a job in the steam-operated power plants. So knowing that, I took him down to Sierra Pacific Power Company in Carson, asked about these new plants that were going up, and was referred to the Reno office. I took Larry over there, and he had an interview with the proper person—his name I do not know at

this present time. He said, "Yes, our two new plants will be coal-fed fires, and we will need experienced coal-fed boiler men." And the pay would be eleven dollars and fifty cents an hour if he were to be accepted. He has about seven more months in the Navy, and at that time, we fully expect him to come back here; he already claims his civilian address as 916 Angus, Carson City [chuckles].

He doesn't always think twice for some of the moves he has made. While in the Philippines, he fell in love with a Philippine girl who was a widow with a nine-month-old child. She had been married to an American who had been a Navy man, but he was killed in an accident with her father's machinery, her father being an agriculturalist. Apparently, Larry fell madly in love with this girl and married her. But thus far he has been unable to get her back from the Philippines, so I don't know just how this situation is going to be. He is a boy with problems, but he seems to get along. And the present plan is that after he gets through on a tour up around the Washington coasts, he will be down here possibly at the same time his brother Jack is here.

That about takes care of all I have to say about my family matters, except I should mention that Ruth and I celebrated our golden anniversary August 18, 1976. There would be a problem for us we thought—we know so many people in Carson City that we wondered what would happen to us if we put one on in Carson City. Friends of ours who had been here a long, long time did that. And we heard remarks from this and that one—"Well, they didn't invite us."

Rather than be faced with such a situation, our daughters—without knowing how we felt about it—decided it should be in Stockton. And they invited only the family and the living wedding attendants, and just one or

two friends. It was put on in the home of Moss and Ed Pickering. They had proper decorations; their swimming pool had a floating “50” in floral design. And everything was really decorated nice; they have a lovely home. The guests included as many of the original wedding party as could be there, and just relatives. Six of the grandchildren could make it—all three granddaughters and all three daughters, of course, because Elaine came from Alabama with her daughter. But the grandsons were limited to three—Joan and Ben’s two boys, and Chuck, Moss and Ed’s boy. Elaine’s three boys could not make it; two of them were at sea in the Navy and the third one, Jack, had married and was not in position—probably because of work orders—to attend. But it was nice to have so many, and we enjoyed it very much; the whole affair was—expenses and the whole works—was borne by our three daughters.

Not only did they put on the fiftieth anniversary, but they arranged a very interesting trip to Disneyland and Knott’s Berry Farm. Ruth and I stayed at the Disneyland Hotel, all expenses paid, and enjoyed our stay. The third day we got on the bus and went to Knott’s Berry Farm. On the bus, we were asked to give the states or the country from which we came, and the girl seated across from us said she was from Germany. I spoke to her in German. She answered in German. We became acquainted. Her name was Renate Kropp. Her husband was an official (vice president) of a German company which had business in America. I believe his business had to do with these artificial pirates and manikins and so forth that operate in Disneyland. And while he was doing that, she was taking a sort of a two-weeks travel tour around the country to see it. She’s a very nice person. She had a beautiful Leica camera, and took pictures of

us; and she wanted a picture of her, especially when she was panning gold at Knott’s Berry Farm. We took her to lunch. Later she took us to a special treat. But she had never heard of a banana split! [Laughs] We enjoyed her company very much. About two weeks after we had arrived home, we received from her two beautiful snapshots, enlarged in color, which she had taken of us.

This didn’t finish our business down there. As soon as our affair was over, Ken and Kathy Jordan, neighbors of ours—a young lawyer and his wife had taken a trip to southern California to visit his parents down at Laguna Beach. So they came up and picked us up at Disneyland Hotel and drove us down to visit their parents. We were already acquainted with their parents; they’d visited here, and we had them for dinner when they were visiting in Carson. So we had a nice time there, and we enjoyed very much the cooking of Mrs. Jordan, who was of French descent. I think she was a Louisiana French—Cajun.

So we enjoyed ourselves very much on this trip, and we owe thanks to our daughters, to the Jordans, and to our little German friend. [Laughs]

* * * * *

But in concluding, I must say that I owe a tremendous amount of thanks to Mary Ellen Glass—the University of Nevada will have to be included, as they furnished her transportation to come back and forth and listen to my rambling— and I appreciate it very much.

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